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COVER: In March 1984, 11 NATO countries participated in Teamwork 84, the largest amphibious operation ever held north of the Arctic Circle. Story on page 2. Photo by CDR Alfred Hamilton, USNR.

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Our Own Worst Critics

Several months ago I sent a letter to our physicians serving in our hospitals and clinics. In it I discussed my view of our responsibility and accountability in providing the highest quality of health care to our patients. Since we all share in this responsibility, I thought it appropriate to share my thinking with all of you.

In this era of credentialing, certification, chart-auditing, peer review, and other concomitants of the quality assurance-risk management programs; rapid advances in the frontiers of medical knowledge; Fraud, Waste and Abuse Hotlines; and increasing medical sophistication and expectations in the population, it is understandable that many of you would be concerned whether support would be forthcoming from my level in the event you should become involved in an incident of any kind. The answer, without reservation, is yes.

I have reviewed all recent cases of litigation and all those situations reported because of potential interest from a quality assurance-risk management standpoint. That review was both gratifying and reassuring. In the overwhelming majority of cases, I found that the care provided was appropriate and well within the standards of "good" medical care.

Accountability is with us to stay, and well it should be. But, we cannot live and practice in fear because of it. Our obligation to our Navy community is too important to allow the scope of our service to be constrained by these considerations. We have within our system some of the best trained and highly qualified personnel to be found anywhere in the world. We have built and will continue to build a training capability without equal to insure that the most recent of concepts are readily available. Our equipment is good and, almost daily, getting better.

What I want to emphasize is that in our practice we remain constantly alert for indications of serious pathology. Take advantage of the system which is available for consultations, second opinions, and further testing and observation as indicated. And finally, that we document what we have done concisely, accurately, and clearly. These initiatives, combined with a fundamental commitment to our patients' welfare, will guarantee a standard of medical care requiring no apology.

Despite our most conscientious efforts, we will make mistakes. We will be criticized when the outcome is less than desired or anticipated even if every aspect of our involvement was correct. Of necessity, we are and will continue to be our own worst critics. I urge you not to fear the scrutiny under which we work. We know how to practice high quality medicine, and that we do it becomes more apparent every day. In return for your continued best efforts, I give you the assurance of my strongest personal support.

William M. McDermott, Jr.
RADM, MC, USN

Teamwork 84

Exercise in the Arctic

CDR Alfred Hamilton, USNR

In any military exercise it is expected that casualties will occur during the normal course of events. When the exercise involves some 80,000 naval and marine personnel from 11 countries and is carried out some 200 miles north of the Arctic Circle, the expectations for casualties rise considerably.

Such was the scenario for exercise Teamwork 84, the largest amphibious operation ever held north of the Arctic Circle. The exercise culminated in mid-March with a night amphibious landing near Tromso, Norway.

Teamwork 84 had a number of "firsts," among which was the simulation of medical casualties by NATO countries during an arctic operation. This "play" involved medical detachments embarked aboard the two amphibious assault ships (LHA's) USS *Saipan* and USS *Nassau.*

Both ships carried special surgical detachments known as Mobile Medical Augumentation and Readiness Teams (MMART). In addition, a NATO medical observation team, led by COMO J.D. Tolmie, MC, USNR-R, was embarked aboard *Saipan.*

Dewitt Roseborough

Large tent at center of photo houses the beach evacuation station at one of the landing sites in Norway for exercise Teamwork 84.

With an MMART surgical team aboard, an LHA can operate as a hospital ship. There are four operating rooms, two X-ray units, and large areas for processing mass casualties. These facilities can accommodate 300 casualties in an expanded configuration. An intensive care unit can handle 17 patients with all the electronic monitoring devices of a modern hospital.

"The *Saipan's* operating suites are as well equipped and as large as those where I work," said COMO Tolmie, an anesthesiologist in Winston-Salem, NC. Dr. Tolmie indicated that the care ashore at the battalion aid stations (BAS) or the beach evacuation stations (BES) may have appeared to be out of a M*A*S*H movie at times, but, he said, "It was stateside big city medicine aboard these ships."

Saipan's medical department head,

CDR Hamilton is a Naval Reserve public affairs officer who, during the Teamwork 84 exercise, served with Commander, Amphibious Group Two.

Photos by CDR Alfred Hamilton, USNR

Simulated casualties are processed aboard USS Saipan.

LCDR Gordon Iiams, explained the operation of the ship's facilities. "During normal operations at sea," he said, "my department's job is to offer routine medical attention to the crew and keep the medical spaces properly equipped and maintained." Dr. Iiams added, "We have no official surgical capability without bringing a surgical detachment aboard."

The detachment aboard *Saipan* was Surgical Team 12 from Pensacola Naval Hospital, FL, and consisted of three physicians, a nurse anesthetist, an operating room nurse, a Medical Service Corps officer, and 13 enlisted personnel. A similar detachment was aboard *Nassau.*

These MMART units were prepared for casualty drills involving some 600 marines, as well as actual casualties that might occur during the course of the 6-day operation. The tagging was planned for casualties of all types, ranging from frostbite to major battle injury. The tagging procedure was a new plan developed by CAPT Ray Johnson, MC, on the staff of Commander, Amphibious Force Atlantic. CAPT Johnson was the medical officer in charge of the exercise.

Once the simulated casualties were tagged in the field, they were moved to the battalion aid stations for initial diagnosis and treatment. They then went to beach evacuation stations for further diagnosis and transfer to one of the two Casualty Receiving and Treatment Ships (CRTS), that is, either of the two LHA's.

Saipan was designated primary CRTS. CDR James Fticsar was the MMART general surgeon aboard *Saipan.*

"Our teams get a lot out of this type of exercise," said Fticsar "although the casualty tagging did not fully test our capability." He added "In any case, it is very difficult to simulate all medical problems completely, because casualties with actual wounds are able to give us cues about pain, location, what kind of pain, and other bits of information like that."

Perhaps the most obvious reason for the inability to test their capability fully was the lack of actual casualties. One of the goals of the exercise was attention to safety, and it was met with overwhelming success; there were no fatalities and no major injuries.

LCDR Iiams said that "At the height of the exercise, we had a patient census of about 25. The detachment did some knee surgery, three appendectomies, and a hernia repair." He added that there also were some cases of dehydration, frostbite, hypothermia, and immersion foot.

On the lack of actual casualties, COMO Tolmie commented, "You can't praise the marines enough for the good cold weather training they received and made use of during Teamwork." The marines prepared for Teamwork's arctic environment with training at Camp Riley, MN, or Pickle Meadows, CA. □

Teamwork 84 Tests Frozen Blood

An unusual operational afloat test of a blood bank using frozen blood was conducted aboard USS *Saipan* (LHA-2) during the vessel's March participation in Teamwork 84.

Saipan contains a sophisticated medical facility, capable of providing beds for 300 and simultaneous use of four operating rooms. The general purpose amphibious assault ship homeported in Norfolk, VA, is also home for the only frozen blood bank in the fleet.

The bank consists of a freezer with a capacity of 300 units of blood. The freezer can maintain a temperature of -120° F.

The bank also has four cell washers used to cleanse thawed blood of cryopreservatives used to protect it during freezing, along with a centrifuge for concentrating the blood before transfusion.

LTJG Robert J. Gossen headed a 3-man team from Portsmouth Naval Hospital aboard *Saipan* during Teamwork 84 to conduct a feasibility test of the blood bank. The massive amphibious exercise involved large marine landings on rough Norwegian terrain 200 miles north of the Arctic Circle and was considered an appropriate test environment.

While no need for a large frozen blood supply was contemplated, additional medical personnel were assigned to *Saipan* and sister ship USS *Nassau* (LHA-4) during Teamwork 84. The personnel and frozen blood aboard *Saipan* would have been vital in response to a major accident.

LTJG Gossen pointed out that the frozen blood bank is unlikely ever to serve as a replacement for the blood procurement programs now in place. He said, however, "The frozen blood is a valuable supplement to orthodox blood supply, especially when ships are many miles from usual sources and systems."

Freezing blood produces three separate blood products. Frozen red blood cells are the byproduct of taking water out of blood cells and replacing it with glycerol, providing much of the same protection an automobile receives from antifreeze. Frozen red blood cells can be stored up to 10 years, compared to the approximate 35-day limit for liquid whole blood.

The process also produces frozen platelets and plasma. These can be stored for about 18 months, compared to their 24 hours of usefulness if stored at normal refrigeration temperatures.

After being thawed, the blood is processed in cell-washers by passing physiological normal salt water through the blood until the glycerol has been removed and replaced with water. No more than an hour is needed for the entire process, frozen unit to transfusion.

The system operates rapidly in an emergency. Two laboratory technicians can process 60 units of blood in 8 hours, an acceptable rate when dealing with most mass casualty situations aboard ship.

Frozen blood availability means large quantities of emergency blood supply need not be drawn from ship's company or embarked personnel and typed by medical personnel. All frozen blood is typed stateside and screened for hepatitis, a process not currently done aboard ship.

CDR Alfred Hamilton, USNR

HM2 Roberto Prescod examines blood unit.

During Teamwork 84, approximately 75 units of blood were thawed and 60 units frozen. While few actual transfusions were needed, the processes were undertaken to provide research data.

The information gleaned during Teamwork 84 was sent to the Navy Blood Research Laboratory in Boston for analysis by a team headed by CAPT C.R. Valeri, MC.

Results of the data analysis will be used to make any needed modifications of the pioneering system aboard *Saipan* before the frozen blood bank is installed aboard any of the Navy's other four LHA's.

—Story by CDR Larry Price, USNR

Perspectives on Tuberculosis for the 80's

CAPT Donald C. Kent, MC, USN (Ret.)

A little over 100 years ago Robert Koch announced that he had isolated the cause of tuberculosis—the tubercle bacillus. At the time of that momentous discovery tuberculosis was Europe's and North America's number one killer, responsible for more deaths than cancer or heart disease. It was scourge that could strike any person or family, regardless of class or economic status. Koch was awarded the Nobel Prize for Medicine in 1905 for this discovery. Yet it was 33 years before the first antituberculosis drug, streptomycin, was discovered.

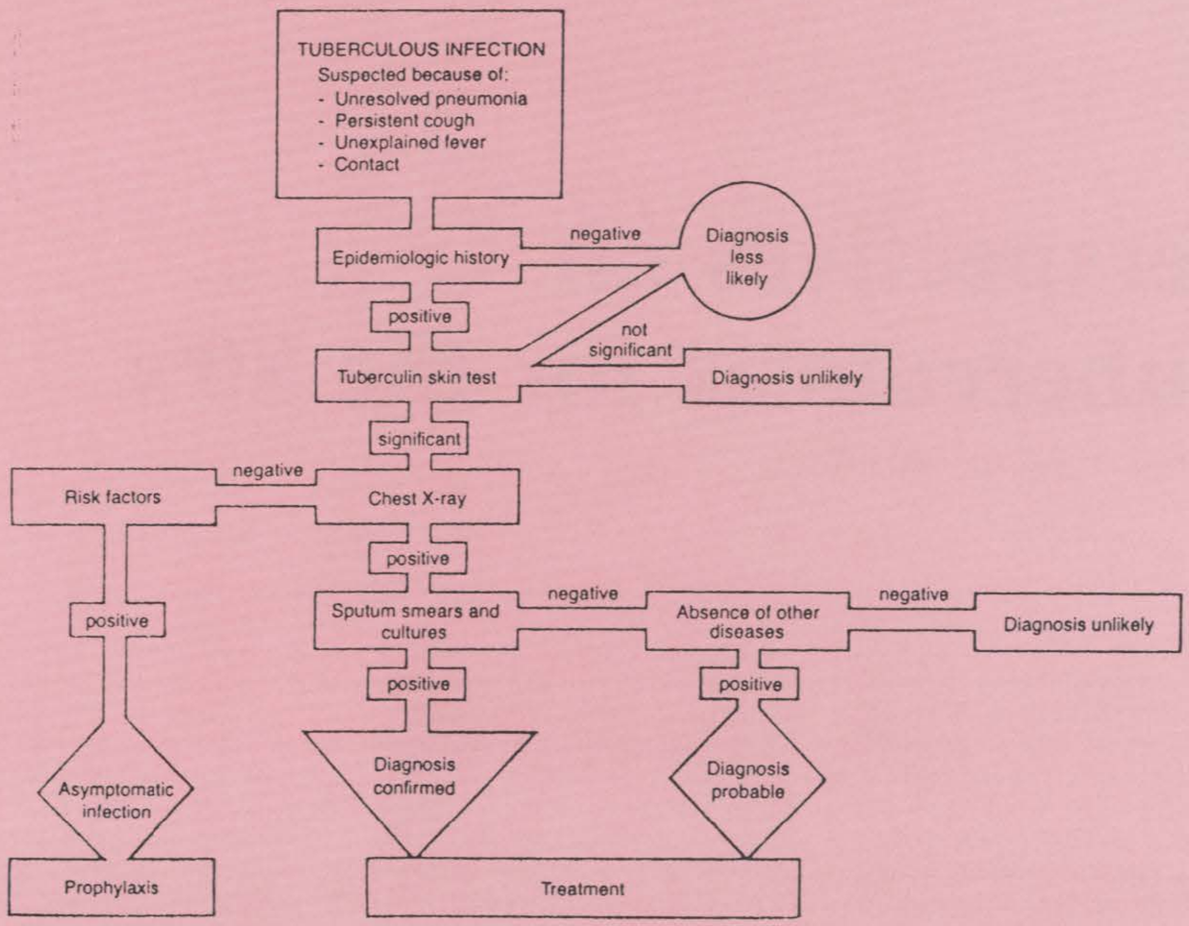
Since that time momentous changes have been made. The old treatment of long term bed rest has generally been replaced by ambulatory treatment. If hospitalization is necessary, it has been moved from the arena of sanitariums to the general hospital. Most of the old tuberculosis sanitariums have now been closed. The treatment now is more often managed by the primary care physician instead of the tuberculosis specialist. We now speak in terms of actual cure, not simply arrest of the disease. Various active chemotherapeutic drugs are now available as the mainline therapy, instead of bed rest, pneumothorax, and other surgery; additional modalities are not usually needed. Today complete control of tuberculosis—even eradication—should be sought. Whereas patients with tuberculosis were once pulled away from home, family, and work for extended periods, present day therapy reverses contagiousness rapidly with a rapid return of the patient to normal life and work. Those who have been in intimate contact can be given oral medication to prevent them from developing tuberculosis.

So if all of these good things are true, why is tuberculosis still around? A chief problem is patient noncompliance. To be cured the patient must take medications as long as prescribed. Some do not do so and recrudescence occurs. They then transmit their disease to others. Such erratic drug-taking may often enhance the development of drug resistant tuberculosis bacilli. A second problem arises from the recent influx of refugees from foreign countries with high rates of tuberculosis. This group is also more likely to have new strains of drug-resistant bacilli. Finally, tuberculosis is distributed so unevenly in our populations that physician awareness of tuberculosis as a cause of disease is often too low in differential diagnostic decisions.

Tuberculosis as a worldwide problem continues to be widespread in developing countries, and even in a number of technically advanced countries it often causes more deaths than all other notifiable diseases.(*1*) Extrapolations from available data suggest that there are 15 million to 20 million infectious cases of tuberculosis in the world. In some areas of Africa, Asia, and Oceania the reported incidence of pulmonary tuberculosis is as high as 250 to 300 cases per 100,000 inhabitants. In contrast to the United States only a small proportion of the world's population today benefits from scientific advances in prevention and chemotherapy of tuberculosis. Such populations may represent a source of infection for an unknown number of our citizens. The most recent available reported incidence rates for several countries are as follows (new cases per 100,000 populations):

Macau	469.4
Korea	249.0
Vietnam	109.5

Dr. Kent is medical director at the Electric Boat Division of the General Dynamics Corporation, Groton, CT 06340. This article is adapted from "Modern Treatment of Tuberculosis in the Maritime Service" originally presented at the annual meeting of the American Occupational Medical Association, Washington, DC, April 1983.



Adapted from: Daniel TM, Mahmoud AAF, Warren KS: Algorithms in the diagnosis and management of exotic diseases. XVI. Tuberculosis. *J Infect Dis* 134: 419, 1976.

Figure 1. Algorithm for the Diagnosis and Management of Tuberculosis: A Logical Progression

Haiti	77.2
Taiwan	39.4
Philippines	328.5
Hong Kong	196.0
Nigeria	93.4
Zaire	54.1

(Remember, these rates are compared to 10.0 for the United States.)

An increased number of cases of tuberculosis resistant to various chemotherapeutic agents are being seen. This appears particularly in imported cases and in the individuals with disease relapse who have not been compliant in taking their drugs. In a 1975-1977 CDC study of tuberculosis drug resistance, 8.6 percent of mycobacteria isolates were found to represent primary drug resistance.(*2*) Rates varied markedly among population groups and geographic areas. Asians and Hispanics had the highest rates, 20.7 percent and 15.0 percent respectively. Younger persons had a higher percentage than older persons, suggesting an increasing incidence of more recently developed disease.

There is evidence that more primary drug resistance occurs in the developing world.(*3*) A comparison of isoniazid primary resistance among various countries is as follows:

East Africa	5.0%
Morocco	16.8%
Korea	18.7%
Samoa	44.8%
Egypt	12.1%

India	10.6%
Taiwan	27.9%

It is worthwhile to review a few truths about tuberculosis with which all health care professionals should be familiar:

1. Almost all tuberculosis patients recover completely if they comply with taking the appropriate medication.

2. Tuberculosis is contagious—but only if undetected and untreated. Even then it is transmitted as an aerosol, usually only after frequent exposures over a prolonged period. A tuberculosis patient who starts taking the appropriate medication usually becomes noncontagious within 2 to 3 weeks.

3. In 1983 a provisional total of 23,532 Americans were reported as new cases of tuberculosis, and approximately 2,000 Americans died of tuberculosis, the leading cause of mortality among the 38 communicable diseases reported to the Centers for Disease Control (CDC) for 1979-1983. In fact, the number of tuberculosis deaths exceeded the combined total for the other 37 communicable diseases reported.(*4*)

4. There were also 55,000 previously diagnosed cases on case registers in December 1980.

5. An estimated 15,000,000 Americans (7 percent of the population) harbor tuberculosis bacilli (+ tuberculin reactors). They can progress to active and infectious tuberculosis.

6. In the United States the greatest number of tuberculosis infections occur among the elderly, refugees, migrants, alcoholics, drug addicts, and especially those who live in urban pockets of poverty. Conditions of malnutrition, overcrowding, unsanitary living conditions, and poor health care contribute.

7. In major cities of the United States the tuberculosis incidence appears to be four to five times the national rate. In 1983 the national case rate for reported cases was 10.0 per 100,000 population.(*4*)

8. Case reports are higher among older persons, males, nonwhites, foreign-born.

9. A typical new case was born in the 1930's, infected in the 1940's, developed the disease in the 1980's.

10. One out of 20 new infections will develop clinical disease within a year after infection if no intervention is applied in the form of isoniazid chemoprophylaxis.

11. A diagnosed case of tuberculosis averages seven contacts, of which 22 percent are infected. One percent of contacts already will have clinical disease.

12. Fifteen percent of tuberculosis is extrapulmonary.

13. One out of every 10 cases of tuberculosis represent a reactivation of old "latent" disease.

14. All individuals who have become tuberculin reactors remain as a reservoir of infection unless intervention is applied in the form of isoniazid chemoprophylaxis. They carry a life long risk of potential disease if not so treated.

15. Today, the top priorities in tuberculosis control are:

- To find and treat those who have infectious tuberculosis and do the necessary followup to insure that the patients take their medications until they are cured.
- To identify the close contacts of the tuberculosis patients, evaluate them, and place them on preventive therapy.

As indicated in the algorithm for diagnosis and management of tuberculosis (Figure 1),(*5*) before tuberculosis can be diagnosed it must be suspected. Suspicious patient symptoms and history include an unresolved pneumonia, persistent cough, unexplained fever, and history of contact. It must be remembered that tuberculosis is a protean, systemic disease which mimics many other conditions, and may be present in any part of the body, often in unusual ways. The diagnosis can be simple, assuming it is considered in the differential. To establish a definite diagnosis, there must be proof of tubercle bacilli in clinical specimens. It is also important to maintain demographic and epidemiologic perspective about the patient in eight of which groups of people are most apt to have tuberculosis. The chest X-ray is essential in the diagnosis of tuberculosis as is the tuberculin skin test (PPD). Several facts relative to the tuberculin test should be stressed:

1. A reaction to tuberculin does not always indicate tuberculosis infection, and a significant reaction does not always mean there is even current disease.

2. A negative reaction does not rule out tuberculosis.

3. False positive tuberculosis reactions result from cross reactivity by mycobacteria other than tuberculosis (MOT).

4. False negative skin tests occur in immunologic hyporesponsive individuals, or are in the early weeks of infection before hypersensitivity develops.

As noted before, a definitive diagnosis can only be confirmed by bacteriology—culture identification is mandatory for proper diagnosis and treatment. Another review of the algorithm provides a readily available approach to proper diagnosis and development of management plans.

Once the diagnosis is established and active disease determined to be present, selection of a regimen of treatment must be made by the treating physician.(*5*) The physician must be thoroughly familiar with the various drugs available, dosages, side effects, and principles of chemotherapy. Otherwise, expert consultation is suggested. The most commonly used antituberculosis drugs are as follows: isoniazid, ethambutol, rifampin, streptomycin, and pyrizinamide (Table 1). Each has particular side effects and inherent contraindications. Only isoniazid and rifampin are bactericidal. One striking feature about modern chemotherapy is the flexibility with which the treating physician can tailor the therapeutic regimen to the individual patient's needs. With the number of drugs available a

TABLE 1. Commonly Used Drugs

	Dosage		Most Common	Tests for	Remarks
	Daily	Twice Weekly	Side Effects	Side Effects	
Isoniazid	10-20 mg/kg up to 300 mg PO or IM	15 mg/kg PO or IM	Peripheral neuritis, hepatitis, hypersensitivity	SGOT/SGPT (not as a routine)	Bactericidal. Pyridoxine 10 mg as prophylaxis for neuritis; 50-100 mg as treatment
Ethambutol	15-25 mg/kg PO	50 mg/kg PO	Optic neuritis (reversible with discontinuation of drug; very rare at 15 mg/kg, skin rash	Red-green color discrimination and visual acuity	Use with caution with renal disease or when eye testing is not feasible
Rifampin	10-20 mg/kg up to 600 mg PO	600 mg PO	Hepatitis, febrile reaction, purpura (rare)	SGOT/SGPT (not as a routine)	Bactericidal. Orange urine color. Affects action of other drugs
Streptomycin	15-20 mg/kg up to 1 g IM	25-30 mg/kg	8th nerve damage, nephrotoxicity	Vestibular function, audiograms; BUN and creatinine	Use with caution in older patients or those with renal disease
Pyrazinamide	20-40 mg/kg up to 2 g PO		Hyperuricemia, hepatotoxicity	Uric acid, SGOT/SGPT	Under study as first-line drug in short-course regimens

variety of effective combinations and treatment schedules can be used. Treatment should always consist of at least two effective drugs in order to increase efficacy and prevent emergence of drug-resistant strains. INH and rifampin, both being bactericidal, have excellent therapeutic potency when combined, and are often capable of curing tuberculosis in less than a year. Isoniazid and ethambutol represent the next best regimen.

Chemotherapy is a two-fold process, first to accomplish rapid reduction of the number of tubercle bacilli, and second to maintain treatment long enough to eliminate the smaller number of persisting bacilli.

The optimum duration of treatment varies from patient to patient and depends on factors such as the hosts' immunologic status, degree of susceptibility of the bacilli, number and kinds of drug given, and the patient's adherence to the prescribed regimen. The physician can expect to have a high degree of success when patients take a regimen of INH and rifampin for at least 9 months, or INH plus ethambutol and/or streptomycin for at least 18 months. Treatment failures in general are less often due to inappropriate selection of regimen than to the patient's failing to adhere to the program for the prescribed time.

Patient compliance can be increased by simplifying and shortening the treatment program and by giving drugs easy to take and well tolerated, such as the 9-month INH/rifampin regimen. Irregular adherence to regimens can also be reduced by increasing patient cooperation through flexible delivery systems of care and with pleasant facilities and understanding personnel. Direct administration of treatment, on a daily or intermittent basis, may be necessary for the difficult patient who cannot—or will not—adequately self-administer medication. Optimal treatment compliance requires close cooperation between patient, physician, treatment facility, and public health authorities. The educated patient will be more apt to be the compliant patient.

Patients who are correctly diagnosed, for whom therapy has been correctly prescribed, and who adhere to and complete the prescribed regimen, will usually be cured. Tuberculosis then becomes merely an item in their past medical history and there is usually no need to follow them indefinitely.

Mistakes in selecting a regimen often occur with previously treated patients in whom drug-resistant tuberculosis has developed. Isolates from such patients require drug susceptibility tests and then the patient should be treated with at least two drugs to which the bacilli are susceptible. One new drug at a time should never be added to a failing regimen. Use of the less commonly used, less active, and more toxic second-line drugs listed (Table 2) are more commonly called upon in this type of tuberculosis. Oftentimes when faced with such a patient, consultation with a chest spe-

TABLE 2. Less Commonly Used Drugs

Capreamycin	15 mg/kg up to 1 g IM	8th nerve damage, nephrotoxicity	Vestibular function, audiograms; BUN and creatinine	Use with caution in older patients. Rarely used with renal disease
Kanamycin	15 mg/kg up to 1 g IM	Auditory toxicity, nephrotoxicity, vestibular toxicity (rare)	Vestibular function, audiogram; BUN and creatinine	Use with caution in older patients. Rarely used with renal disease
Ethionamide	15-30 mg/kg up to 1 g PO	GI disturbance, hepatotoxicity, hypersensitivity	SGOT-SGPT	Divided dose may help GI side effects
Para-amino-salicylic acid (aminosalicylic acid)	200-300 mg/kg up to 12 g PO	GI disturbance, hypersensitivity, hepatotoxicity, sodium load	SGOT/SGPT	GI side effects very frequent, making cooperation difficult
Cycloserine	10-20 mg/kg up to 1 g PO	Psychosis, personality changes, convulsions, rash	Psychologic testing	Very difficult drug to use. Side effects may be blocked by pyridoxine, ataractic agents or anticonvulsant drugs

cialist is necessary to outline the proper treatment regimen.

Chemotherapy, which has revolutionized the treatment of tuberculosis, can also now be used effectively to prevent disease.(*5*) Such preventive treatment appears to act by diminishing the number of tubercle bacilli in healed tuberculosis lesions, oftentimes radiographically invisible. Such preventive therapy can substantially reduce future morbidity due to tuberculosis in high risk groups. Isoniazid is the only drug which has been proved effective in such preventive therapy. This is administered in a dose of 300 mg, once daily, for 12 months, in the adult; and has proved to be effective, inexpensive, administered orally, easy to take, with a minimum of side effects. Larger doses and longer periods of time administered do not increase the efficacy of the prevention.

Of particular importance to the Navy is the experience with epidemics of tuberculosis on ships, in which the method of transmission in the closed shipboard environment was ascertained to be droplet infection through ventilating systems (closed recirculation ventilation). Recent experience suggests similar occurrence on two maritime ships.(*6-8*)

In closing, it is appropriate to quote from a little known poem written in 1890 by James Hurd Keeling, entitled *The Song of the Squirt,* which was written about the tubercle bacillus, a pathogen that had been described by Koch only 8 years previously.

"As far as is known, it may very well be
That we'll soon reappear, quite frankly and free,
So tell Pasteur and Koch, or whoever they be,
That they're not seen the last of my comrades
and me."(*9*)

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"Fleet" Family Practice in Newport

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Family Practice, although new to Naval Hospital, Newport, is a well established specialty within the Navy, having begun in 1970 at Naval Hospital, Jacksonville, FL. Family Practice became a specialty as recently as 1969 with the inception of the American Board of Family Practice.

In 1979 a group of Jacksonville family practice residents envisioned a fleet-oriented Family Practice Department for the Newport, RI, area, but due to billet constraints, implementation of the proposal did not occur until 1982 when family physicians were first billeted in Newport.

Methodology and Philosophy

The Family Practice Department that developed as the Navy's first Family Practice department in New England utilizes an innovative surface fleet-oriented format.

It is patterned after the Aviation Family Practice Clinic at NAS Jacksonville, and enrollment is strictly voluntary. The program is offered to all married active duty crewmembers and their dependents attached to Commander Naval Surface Group Four (consisting of Staff SURFGRUFOUR, USS *Edson* (DD-946), USS *Connole* (FF-1056), USS *Capodonno* (FF-1093), USS *Miller* (FF-1091) and USS *Valdez* (FF-1096), USS *Affray* (MSO-511), USS *Exploit* (MSO-440), the Shore Intermediate Maintenance Activity, and the area Coast Guard vessels. Second priority was offered to all other married active duty members assigned to the Newport area for longer than 1 year. In addition, approximately 10 percent of each physician's patient panel consisted of retired members and their dependents in order to provide each physician with a greater diversity of patient ages.

The ultimate goal was for the physician to develop a rapport with his ship(s) as a unit as well as with his individual patients. In this way, the physician would become acquainted with each ship's unique health care needs and be in an excellent position to respond to those needs. Unit identity and increased unit morale would be fostered due to a large portion of the families receiving medical care from a single physician. According to CAPT Theodore D. Gross, MC, commanding officer at the Naval Hospital Newport, "The Family Practice Clinic provides a tremendous service to families. In the cases of those on the ships who are enrolled in Family Practice, the physician can understand family stress and pressures. The family doctor is also the ship's doctor. This closes the loop for comprehensive care. The Navy *family,* not just dependents and sponsors, is whom we should be thinking about."

Implementation

During the months preceding September 1982, many hours of advance planning were necessary to obtain clinic space, essential supplies, and ancillary personnel. A complete list of essential materials was developed and amended as necessary. Because the Family Practice Department was new to the naval community at large and the hospital staff, public information was essential in getting the department off to a successful start. In early September 1982 the commodore of SURFGRUFOUR was briefed on the concept of "Fleet" Family Practice. In addition, each physician briefed the commanding officers of his ships as requested and forwarded applications to each ship's omsbudman. Members of the Health Care Consumer's Council (a liaison group consisting of representatives of all local commands) were briefed and announcements were placed in SURFGRUFOUR's plan of the day. The new department updated the hospital staff with a Continuing Medical Education presentation entitled "Family Practice in the Military."

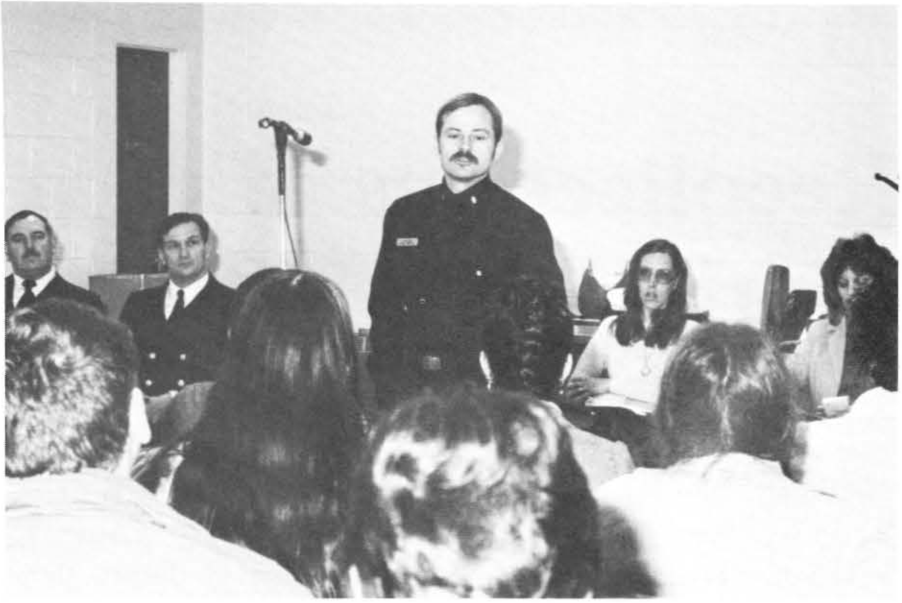
Within days the clinic was scheduling its first patients. Over the next several months enrollment rapidly increased as did utilization of the clinic. Presently, the department provides care to 75 to 100 outpatients per clinic day, follows an average of 3 to 5

Sick call sessions improve the physician's insight into shipboard medicine. Here, LCDR Joshua Bennett examines a patient aboard USS Miller.

Dr. Read and Dr. Bennett are staff family physicians at Naval Hospital, Newport. Dr. Taggart is Head of the Family Practice Department. JO2 Shaw is a journalist stationed at the Naval Education Training Command, Newport, RI 02841.

inpatients, and delivers 10 to 15 newborns per month.

In addition to his providing medical care as a family physician, he also serves as the ship's doctor. Each ship's independent duty corpsman has telephone access to his medical officer for patient consultation, regardless of the patient's enrollment status. The consultations have, on occasion, included acute medical problems. One example was a ship-to-shore communication between LCDR Richard Taggart and HMC David Scharf of USS *Miller* concerning a seaman with acute abdominal pain. This enabled HMC Scharf to initiate appropriate therapy prior to medevacing the patient to Naval Hospital Newport for definitive management. The majority of the consultations, although not as dramatic as an acute abdomen, allow rapid resolution of a medical problem.



LCDR Edward Read addresses dependents of USS Connole *at pre-deployment briefing.*

Additionally, the physicians provide on-board consultation by holding ship sick call on a rotating basis one afternoon per week while ships are in port. These sick call sessions improve the physician's insight into shipboard medicine by displacing him from his usual hospital setting. The relationships established between the physician/corpsman and physician/crewmembers improve the quality and efficiency of the medical care delivered. This enables the corpsman to examine patients with a medical officer and provides informal continuing medical education as well as enhancing the physician/corpsman relationship. In this way the ship's corpsman can initiate on-board therapy and save vital man-hours. HM1 Tony A. Zarate, independent duty corpsman, USS *Exploit* (MSO-440) relates that "The visits enable crewmembers who can't break away from their shipboard duties to see a doctor. Having a small ship, one man being away creates a large loss in manhours." The corpsmen have been included in the Family Practice Clinic's Tuesday afternoon minor surgery clinic. This affords corpsmen the opportunity to receive further instruction in minor surgical skills which may be utilized during deployments.

Corpsmen are included in the Tuesday afternoon minor surgery clinic. Here, LCDR Richard Taggart instructs a corpsman in minor surgical techniques.

A key area where the rapport between crewman, family, and medical officer is most beneficial occurs when family dysfunction results in poor work performance. Timely resolution of problems can be accomplished as a direct result of this established relationship. This rapport becomes extremely valuable during ship deployments. The family physician's involvement begins with participation in dependent pre-deployment briefings. Frequently, the deploying married crewmember is uneasy and wonders, "Who will take care of my family if something happens while I'm gone?" The one physician/one ship arrangement gives a face and personality to this "who." During the deployment the physician serves as a liaison between the hospital and the deployed ship. He often assumes the role of medical travel advisor for dependents who will meet the ship in foreign ports.

Summary

As the surface fleet expands during the 1980's, the Fleet Family Practice concept will incorporate any new ship homeported in Newport. This will undoubtedly require considerable advance planning for staff physicians, facilities, and ancillary staff. Based upon the current level of success and acceptance of this system, the time and effort will be a prudent investment. We encourage all Navy family physicians to consider a "fleet" oriented system for any surface, submarine, or aviation facility staffed with family physicians. □

Recollections of a World War II Corpsman

CAPT Edmund Shimberg, MSC, USNR

We came from naval bases all over the country that hot summer of 1944. I had been at the Naval Air Station in Olathe, KS, a primary base for Naval Air Cadets that was 10 miles from the population center of the United States and 30 miles from Kansas City, MO, which may have been the world's second greatest liberty town. But that's another story.

Some of us were volunteers. I, for example, couldn't see serving out the war in the Navy in the middle of the U.S. Others were clearly castoffs, rejects, and people some other command just wanted to get rid of. In other words, we were a fairly typical group of sailors sent off to form a brand new unit. The unit was named Corps Evacuation Hospital #2 and was one of three. Our ultimate purpose was to serve as a combination evacuation center and what today, I guess, would be called a M*A*S*H.

The commanding officer was CAPT Lyon, a Regular Navy medical officer, and the executive officer was CAPT Irwin S. Brown, a Reserve physician from Kansas City, MO. There were a number of other medical officers, all Reserves, and with a wide variety of medical specialities—everything from a neurosurgeon (William T. Spence) to a pediatrician (Harry Horwitz). There were a number of Hospital Corps officers (the forerunner of the Medical Service Corps)—all mustangs. And, finally, there was the leading Chief Petty Officer, Chief Pharmacist's Mate A.J. Clark—a legend in his own time. He had about 12 years in the Navy at the beginning of WWII and, as was typical of that time, had risen to 3rd class petty officer. With the war, he had risen rapidly. He was a one-of-a-kind character who would tell us to "Stop making mountains out of mole hills" and would caution us to get up for "revalley" in the morning and make certain that the "Shenelly bottles" were not lying adrift in our living spaces. Yet, he was a warm, wise, and compassionate man who led by example and who really took a bunch of ragtag Reserves and prepared them for whatever lay ahead.

So there we were, billeted in what was still known as the Tank Park at Camp Lejeune, NC. We trained in a modified version of Field Medical School, which was geared to our needs as a unit. Following the training period we entrained for Camp Pendleton, CA. Anyone who has never lived aboard a troop train for a week has missed an experience worth missing. We were in Pullman cars that seemed to antedate the Civil War and were fed (standing up) in a converted cattle car. From time to time the train would stop at a siding and we would be marched off, given the opportunity to perform some calisthenics, and then returned to our Waldorf-on-wheels.

We arrived at Pendleton in one piece (both unit and individuals), spent the next few weeks marking our gear, which had been sent to the Marine Base in San Diego, and performing endless calisthenics and taking swimming lessons geared to survival. At one point we had to jump off a 15-foot tower fully clothed (including helmet), simulate pushing the burning oil out of the way, and then swim two lengths of the pool. This was all OK with me except for the long jump down. As a result, I have the distinction of having been propelled off the tower with the foot-to-the-rump technique by Bill Ozmanski, a former professional football player with the Chicago Bears who was then a Navy dental officer.

After our gear was loaded on board ship we joined it, sharing an adjoining hold on the MS *Bloenfontaine,* a Dutch vessel with a Javanese crew that was later sunk by a Kamikaze at Okinawa. We slept in bunks stacked five high and learned early on that the top bunks were choice because they were under the ventilating ducts which we could and did cut open with our invaluable KaBar knives in order to direct a flow of cool air on ourselves. We were fed twice a day, spent interminable hours on chow lines, and—insult of insults—the chow line wended its wearisome way past the officers' mess

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Dr. Shimberg is a clinical psychologist practicing in Woodbury, NJ.

The author at Tientsin, China, January 1946.

where we could see real food being served, and three time a day.

There was very little to do on board ship except listen to the country music that a crew member favored, read whatever we had brought on board, and, of course, play cards. I got into a running poker game which reduced me to a state of bankruptcy that lasted our first 3 months on Guam. My poker-playing buddies had graciously granted me a line of credit and, as a result, for those next 3 months there were two pay lines. I'd get paid and then my creditors would line up in front of me. They let me keep enough for cigarettes and Cokes until the next payday.

We spent 36 long, hot, sticky days on the *Bloemfontaine* and our only respite was at Pearl Harbor, where we remained for 3 days. On the second or third day they marched us off for recreation. In fact, we marched to the CPO club, were given a can of pineapple juice, and marched right back to the ship.

We stopped at Eniwetok, Saipan, and, finally, dropped anchor at Guam, which was to be our base camp.

Guam, in the late fall of 1944 had only recently been retaken from the Japanese and there was still a raw, immediately-post-combat look to it. There were no permanent buildings, no paved roads, and Agana, the capital city, was in ruins. The only building that looked anything like it may have before the invasion was the cathedral, and it was largely a shell. All else was a wall here or a pile of rubble there. We were trucked to our permanent area, which was up in the hills, not far from the base camp of the 3rd Marine Division.

The first few weeks were spent in setting up our own base camp. We lived in 5-man pyramidal tents which, at the beginning, had no decking of any kind and so we could watch rivulets become small, fast-running streams as they went through our tents. We were next to a grove of plantains (which are in the banana family), and each tent soon had its bunches of bananas hanging from the center pole. We also quickly learned that the banana tree is largely water; it gives one a tremendous feeling of strength and power to be able to cut down a large, impressive tree with one quick swipe of a machete.

At the same time we were making our area more habitable, we learned to set up and take down the tenting we would be using in the combat zone. There were long ward tents and a variety of other, smaller tents that would be used as operating rooms, treatment tents, administrative spaces, etc. Our expertise and self-confidence grew as we practiced over and over again. There were also regular lectures from medical officers on the various treatment methods to be used; on one hand we were circus roustabout and construction men while, on the other, we were maintaining and improving our skills as Navy hospital corpsmen.

One of the great events during this time was the night the generators finally went on line and we had electric lights in our tents and could put away the ubiquitous Coleman lanterns with the mantles that always seemed to give out in the middle of a big poker game.

In March 1945, we once again boarded a troop transport along with our gear and left for the Okinawa campaign. We rode high the first night out because we were the only unit aboard. The next day we stopped at Saipan, where we took aboard a large conting-

Photos courtesy CAPT E. Shimberg, MSC

"Home" Okinawa, 1 April-21 June 1945.

ent of marines and then left to meet up with the task force. After some days of steaming we arrived at the lagoon of Mog Mog atoll in the Caroline Islands group. The sight was one that no witness will ever forget. There, quite literally, was the might of the U.S. Navy in World War II: Warships and support vessels seemed to cover the water in an almost solid mass. While we swung on the hook, an outrigger canoe came alongside manned by natives who had come out to sell us some fresh local produce. They looked like characters out of a Dorothy Lamour film.

We left for Okinawa and, while enroute, were briefed about the island and the reasons for the campaign. We were all warned repeatedly to wear our leggings because there was a particularly fierce snake indigenous to the island, whose bite would kill. I don't know of anyone who even *saw* one of them. (When I returned to Okinawa 38 years later I learned that they do indeed exist, and that people are bitten from time to time. I guess we scared them off!)

We arrived at Okinawa shortly after D-Day and anchored off the northern landing beaches. We could see shell fire and a pall of smoke over much of that part of the island. There was a great deal of air activity and the Kamikazes were also in evidence. A destroyer, a few hundred yards away, was hit by one and we could clearly see it burning. We were really frightened to remain on board the transport and yet, interestingly, the crew told us that they, in turn, preferred the safety of their ship to going ashore as we would have to do.

We landed on the beach at Nago on D plus 12. The first night we dug in on the beach and experienced our first air raid. I shared a foxhole with a friend (Richard E. Smith from Amsterdam, NY), and we could look up and see the enemy planes overhead. They were low enough so that the "meatballs" on the wings were clearly visible. The next day we moved inland and dug in in a valley; the hills on either side were terraced. We came under fire that night from Japanese soldiers who were using small arms, machineguns, and mortars. Happily, there were no casualties. After that, we dug in on the terraces and avoided further problems.

Not far from our trenches was an ice house which, for some reason, the Japanese saw as a worthy target. Every night a single plane would come over and try to hit it. He usually came over in the small hours of the morning, disturbing our sleep.

After a few days at Nago, we went on board an LSM, along with a cargo of ammunition, and sailed for the southern part of the island where we set up and went to work as a hospital, remaining there until the end of the campaign. And it was here that the training paid off. Strangely, it seemed to us that we all really knew what we were doing. The surgeons *really* knew surgery, the corpsmen *really* knew their jobs, and the equipment *really* worked and was maintained by the artificers in the unit. It was, as history has recorded, a hard, difficult campaign. We handled many casualties and saw many tragedies. At one point we treated the remnants of an entire company of marines—about four or five men. We treated young marines who had been in boot camp at the beginning of the campaign.

Torrential rains filled knee-deep ruts created by the vehicles coming in and out of our compound. At one point I developed a viral pneumonia and was treated with massive (at that time) doses of penicillin; 10,000 units! I recovered.

After the campaign we boarded an LST for the trip back to Guam and got caught in the tip of the typhoon that sank so many ships, but happily, did not experience the worst of it. At one point a few of us were on the fantail and, looking forward, noted that the LST seemed to be bending in half. As we were making certain that our life jackets were securely fastened, a crew member assured us that the LST's were constructed with an expansion joint so that they *would* bend and, as a result, would not break in half.

My foxhole buddy, Smitty, developed dysentery during the campaign and, as a result, had lost an enormous amount of weight to the point of emaciation. He looked awful! Without his knowledge, we told the crew members of the LST that he had been a prisoner of the Japanese and that his appearance was the result of

NAVMEDCOM Archives

Amphibious assault: Okinawa, 1 April 1945

Aftermath of battle: Nago, Okinawa, April 1945

his being starved and beaten by them. Smitty had no idea why they brought him extra rations and ice cream, and why they all stared at him as though he were a curiosity.

We came back to Guam and, in the few months of our absence, there were major changes. Now there were paved roads and permanent buildings. Our base camp, of course, had not changed. We settled in and discovered that, while civilization had come to the rest of Guam, things were no different for the marines and their associated units. The Navy and Seabees had fresh food; we were still using canned rations. When we could, we would slip down to the Navy base and get in their chow lines. On the first of these trips we were on the back of a truck when firing began at a rifle range just below us. My buddies and I dove for the bed of the truck and tried to scratch out a foxhole—we'd only been back from Okinawa a few days.

We knew that we were slated to participate in the invasion of the main island of Japan, and we spent the rest of that summer of 1945 replenishing gear, retraining, and resting. Rest ordinarily consisted of ditch-digging and can-smashing. Can-smashing was a highly complex operation requiring the close cooperation of two highly skilled hospital corpsmen; one set the can upright on a tree stump and then the other smashed it flat with a sledge. Can-setting was the more highly skilled and desirable job. I usually swung the sledge.

The night the war in the Pacific ended we were all in our beds. Loud noises and sounds of greater-than-usual frivolity were heard from the CPO tent and, when we went to check, we got the news. Mixed with the joy and genuine sense of relief was a feeling of "so what." We were still out there in the Pacific. We all went back to bed and about 5 minutes later a voice came out the darkness. "Well, the war's been over for 15 minutes and they still haven't done anything about getting us home."

About a month later we boarded another troop ship, the USS *Dashing Wave,* and left for China. While anchored off the coast of China we got word that those with enough points would ride the ship home and the rest of us would join the 1st Marine Division in Tientsin. I ended up with the 11th Marines. Tientsin was the world's greatest liberty town but, once again, that's another story.

After a little over 6 months in China I was rotated home, took a train across the country, and was discharged from active duty at the Navy Separation

Center in Lido Beach, NY, which had been a major amphibious base.

I remained in the Naval Reserve, was commissioned during my internship year and, 38 years after the campaign, returned to Okinawa.

In April 1983 I was assigned to the Naval Hospital, Okinawa, for 21 days temporary active duty under the RESMOP/TEMAC program. The island was, of course, almost totally unrecognizable, except for the topography. Naha (the main city) and Nago looked like suburbs of Los Angeles. One Sunday morning I drove up to the northern end of the island to see if I could locate our landing beach and the valley. Drawing closer to the site, I began to understand what William Manchester meant about the feelings he had described in his book *Goodbye Darkness.* I felt mildly despressed and experienced some anxiety. I pulled over to the side of the road, walked on the beach for awhile, gathering my thoughts and feelings together. Returning to my car, I continued the drive north and outside of Nago located the approximate area where Smitty and I had dug in that first night ashore. To duplicate the feat now I would have had to drill through a four-lane highway. I took some pictures and then drove into the valley just beyond Nago. The rice paddies were gone and, in their place, there were a few houses. The terraces on the hillsides were still barely visible, but they were no longer under cultivation. Again, I took some pictures, sat in the car for a while, thinking and remembering, and then I drove back to the real world of today.

Nine weeks later I was in California, having dinner with Smitty. We've remained friends all this time, even though he has lived in California for many years and I remain on the East Coast. We looked at the pictures, told our wives some outrageous tales (some of which were even true), and then brought each other up to date on our present lives.

So there it is. The story of one extremely small cog in the big wheel of World War II. Would I have missed it? No, it was, I think, the one great adventure in the lives of most of us who experienced it. Would I do it again? Not on your life. □

Jeannette Update

The March-April 1984 *U.S. Navy Medicine* story on the voyage of the *Jeannette* continues to draw interest. Recently, Mrs. Julia A. Cox, grandniece of Dr. James M. Ambler, surgeon of the arctic steamer *Jeannette,* forwarded her great-uncle's dress uniform and sword to the Navy Memorial Museum at the Washington Navy Yard. The Ambler memorabilia will be part of a forthcoming exhibition on arctic exploration.

Dress uniform coat, sword belt, and sword

Surgeon James M. Ambler

Forty Years of Medical Research

CAPT James Vorosmarti, MC, USN
CAPT Vernon D. Schinski, MSC, USN
Mary L. Grady

For more than 40 years the Naval Medical Research Institute (NMRI) in Bethesda, MD, has been researching the various diseases and operational problems which affect the health and safety of naval personnel. Since its commissioning as the Navy's first medical research and development laboratory, the Institute has grown dramatically and has engaged in numerous and diverse projects, ranging from the analysis of captured Japanese cigarettes for marijuana during World War II, to participation as a major international laboratory in the development of a gene-coding system for organ and tissue transplantation.

The Navy's need for a large, multidisciplinary research facility was first recognized by a young naval medical officer, LT A.R. Behnke, Jr. He became aware of the lack of medical research support when he was assigned to conduct physiological studies during tropical cruises, first aboard USS *Nevada* and then aboard USS *Tuscaloosa* and USS *New Orleans*. Reports of these studies were prepared by Behnke and forwarded to RADM R.T. McIntire, MC, then Surgeon General of the Navy. Unknown to Behnke, the Surgeon General shared these reports with President Franklin D. Roosevelt, who had been on several cruises aboard *Tuscaloosa* and was well aware of the major problems posed by heat stress aboard ship. Subsequently, Behnke received the wholehearted support of the President and the Surgeon General when he recommended to the Bureau of Medicine and Surgery that a research facility be incorporated into the new Naval Medical Center in Bethesda.

When commissioned on 27 Oct 1942, the Institute had an initial staff of 13 officers and 50 enlisted men and an ambitious mission to conduct basic and applied research and development concerned with the health, safety, and efficiency of naval personnel. Soon thereafter, LT Behnke was assigned to the Institute. He later became NMRI's research executive and served as officer-in-charge of the experimental diving unit during World War II.

For the duration of World War II and the Korean War most of the work carried out at NMRI was designed to solve immediate fleet problems, i.e., protective clothing, desalination of sea water, aviation oxygen equipment, insect repellents, the physiological effects of tropical environments, body armor, and the analysis of captured enemy medical equipment and drugs.

Immediately after World War II NMRI studied nuclear blast survivors and analyzed the biomedical effects of the Bikini and Eniwetok atomic bomb trials. These studies resulted in improved methods for the treatment of radiation exposure. Because of great interest in this area and based on the program developed at NMRI, a separate facility was established and commissioned for the study of radiation effects—the Armed Forces Radiobiology Research Institute.

Following the Korean War, NMRI's basic mission remained the same, but the approach to research at the Institute changed to reflect a lessening of the pressure for immediate solutions to war-related operational problems. Studies were initiated to pursue solutions to specific medical and operational problems of a long-term nature. The Institute developed a multidisciplinary approach which called for increased collaboration in particular fields to produce a more timely result for the fleet.

As part of altitude studies carried out at NMRI and in conjunction with the space flight program, the Strato-Lab was launched in May 1961 from USS *Antietam* in the Gulf of Mexico. Carried aloft by a 10,000-cubic-foot balloon, Strato-Lab set numerous records which still stand. It was the first manned balloon flight from the deck of a carrier, the highest ascent (113,740 feet) achieved by man in an open gondola, and the largest balloon ever used in manned flight.

NMRI gained greater visibility and recognition within the scientific community at large with the establishment of the Navy Tissue Bank for the storage and transplantation of tissues for

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CAPT Vorosmarti was commanding officer of NMRI from September 1980 to January 1983 and is now on the staff of the Undersecretary of Defense for Research and Engineering. CAPT Schinski was NMRI's executive officer from April 1981 to December 1983 and is now commanding officer of NAMRU-2 in Manila. Ms. Grady is NMRI's command editor.

NMRI's main building

combat casualties.* The Tissue Bank at NMRI has been a model for setting up other tissue banks throughout the world. Banked tissue is invaluable for the treatment of casualties. The NMRI Tissue Bank collects, processes, stores, and distributes bone, skin, dura, and blood vessels, and is currently involved in an intensive bone marrow transplantation study. The research performed here, including gene coding and tissue matching to prevent graft-versus-host disease and other similar problems, has been basic to much of the advances in this field over the last 15 years.

Similarly, Institute investigators have been in the forefront of research in several other critical areas. NMRI continues to be a leading facility in the study and treatment of shock in combat injuries, both for shock caused by blood loss on the battlefield and by infections following severe wounds. NMRI developed techniques for improved treatment of devastating maxillofacial wounds, and the textbook which resulted from this work is now used throughout the world for surgical techniques and patient care.

NMRI is a leader in diving physiology, with one of the best teams now in existence for the study of the numerous problems that still plague divers and disrupt diving operations. The Institute's sophisticated hyperbaric research facility, commissioned in July 1981, greatly enhances the capabilities of researchers and allows studies to be completed more efficiently. This facility includes a large man-rated compression chamber system capable of simulating ocean depths to 3,400 feet. Appropriately, the facility was dedicated in honor of CAPT A.R. Behnke, Jr., MC (Ret.), who was present at the ceremony and happily cut the ribbon with his diver's knife.

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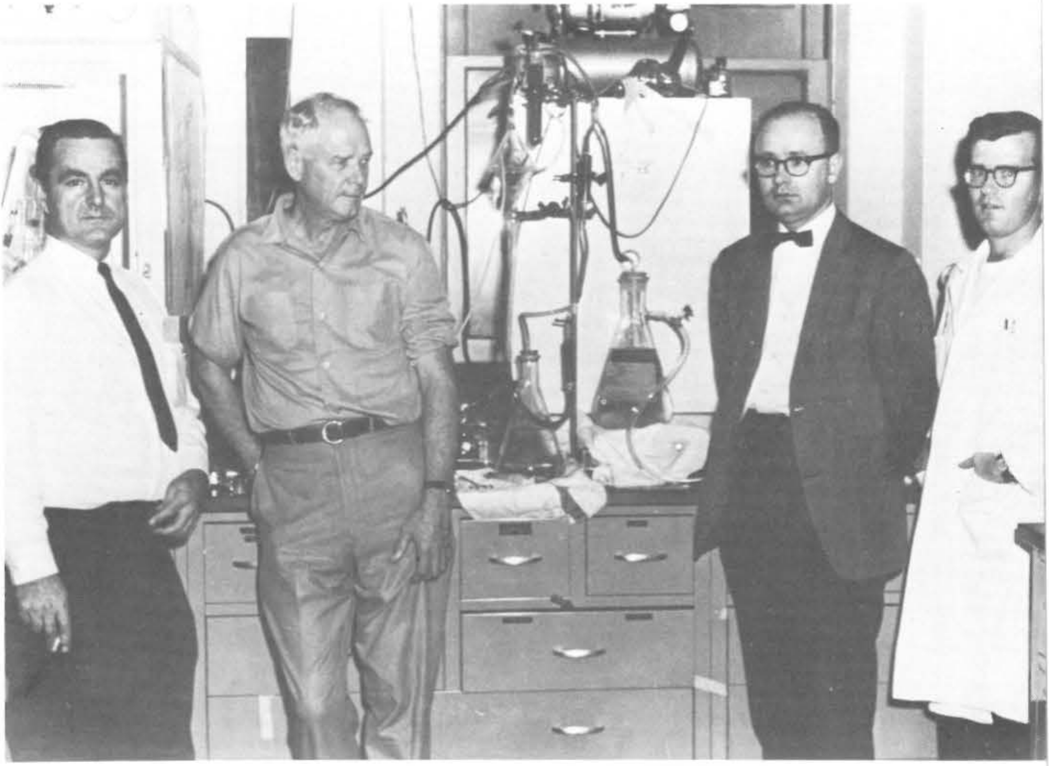
*See "The Navy Tissue Bank," *U.S. Navy Medicine,* May 1980.

Right: Collaboration with Charles A. Lindbergh (second from left) on techniques of organ perfusion for storage led to development of an early heart-lung machine.

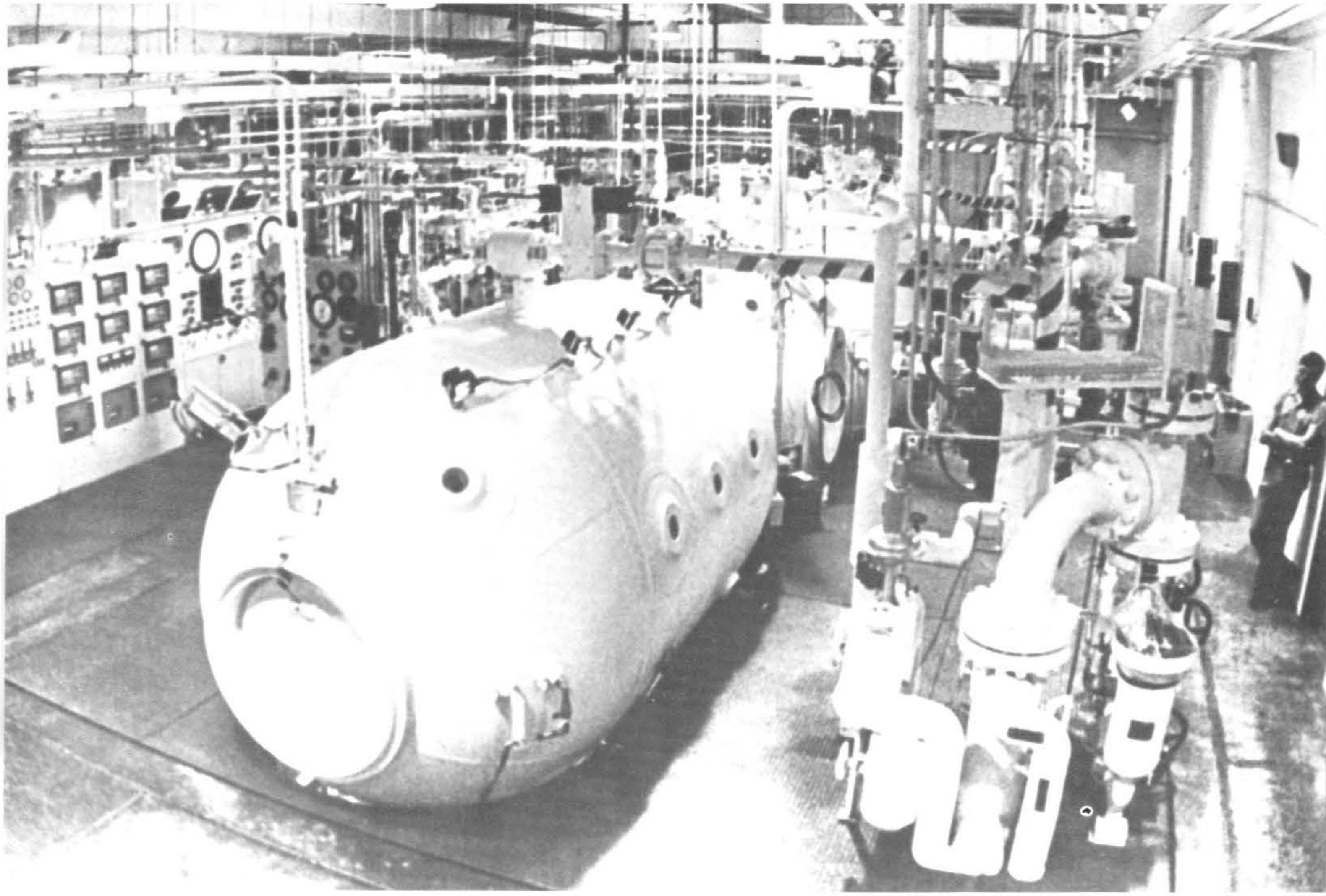


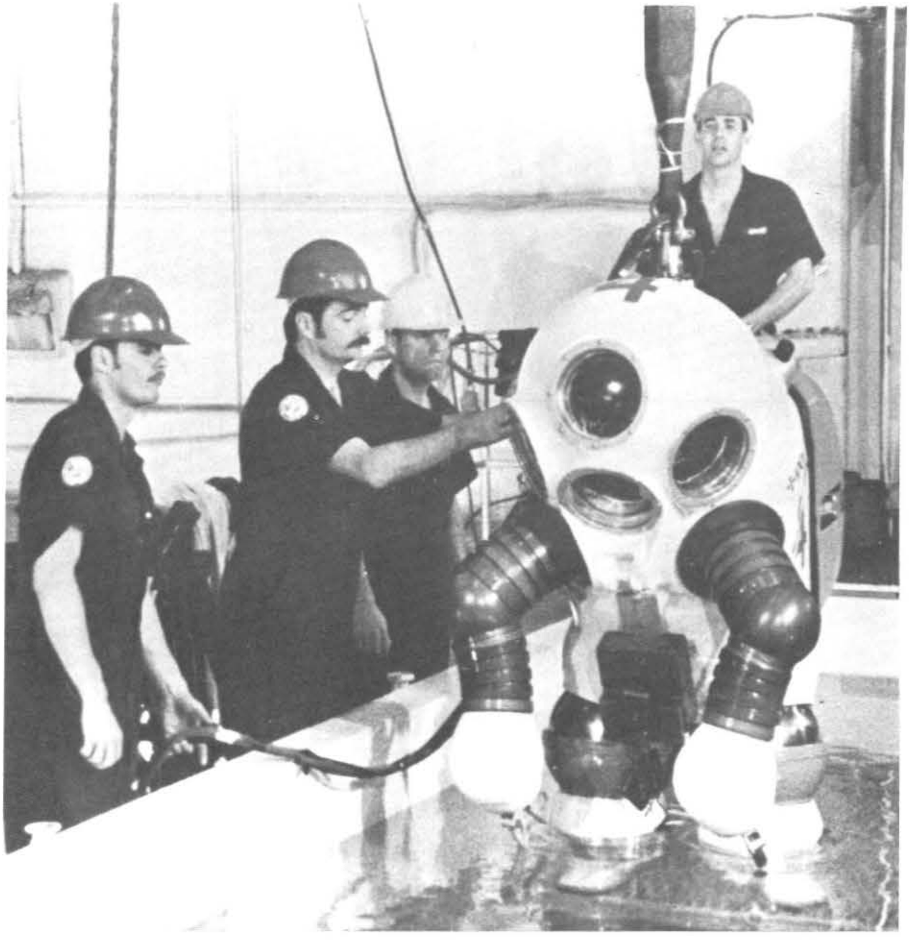
NMRI researchers working in the area of thermal stress have helped formulate guidelines for exposure limits in hot and cold environments. Studies were recently conducted aboard USS *Saipan* and USS *Nassau* to validate heat acclimation procedures for marines en route to hot, humid areas. The human calorimeter developed at NMRI made possible the rapid, accurate measurement of body heat output and changed the classic concept of body temperature regulation. In addition, studies in the prevention of cold injury resulted in the production of the "Mickey Mouse boot," which is still used for operations in cold, wet environments.

In the study of infectious diseases, the Institute has played a prominent role in the development of vaccines for typhus and malaria. The decrease in infectious disease casualties over the last 40 years has been impressive; much of this decrease can be attributed to the intensive investigations carried out by NMRI investigators. Basic research in infectious diseases and vaccine development have been vigorously pursued, and vital surveillance activities have been accomplished worldwide to provide data for further studies.

Over the years NMRI's investigations in support of fleet biomedical needs have grown and diversified. Along with this has come a commensurate growth in facilities and personnel. Currently, NMRI's staff is comprised of 75 officers, 48 civilian scientists, 161 enlisted personnel, and 129 civilian support and technical personnel. NMRI is the Navy's largest and most diverse biomedical research facility. In addition to the main Institute in Bethesda, a Toxicology Detachment has been established at Wright-Patterson Air Force Base in Dayton, OH, and, in January 1983, an

Techniques for long-term storage of tissues by cryopreservation were developed at NMRI; here, technicians culture individual tissue deposits prior to freeze-drying. Temperature and vacuum clocks on freeze-drier are seen in background.





Above: NMRI's man-rated compression chamber system for hyperbaric studies. Left: Institute researchers conducted the physiological and human engineering assessments of "JIM," a one-atmosphere diving system designed to work at depths to 1,500 feet.

Infectious Diseases Detachment began operations in Lima, Peru.*

Throughout its history NMRI has been an extremely productive and vital component in the Navy's efforts to enhance and protect the health, safety, and efficiency of all Navy and Marine Corps personnel. The Institute continues to be at the forefront of biomedical research and development and is currently carrying out investigations in the areas of casualty care, environmental stress, infectious diseases, hyperbaric medicine, and transplantation research. □

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*See "What's a Namrid," *U.S. Navy Medicine*, July-August 1984.

The Grave on Hospital Point

ERECTED
IN HONOR TO THE MEMORY OF
MAJOR JOHN SAUNDERS
OF THE UNITED STATES
LIGHT ARTILLERY
BORN
IN VIRGINIA A.D. 1771
DIED
AT THIS PLACE A.D. 1810

He was a Soldier of Chivalric
Spirit
A man of Honor, Generous,
Hospitable
Beloved and Esteemed by all
who knew him.

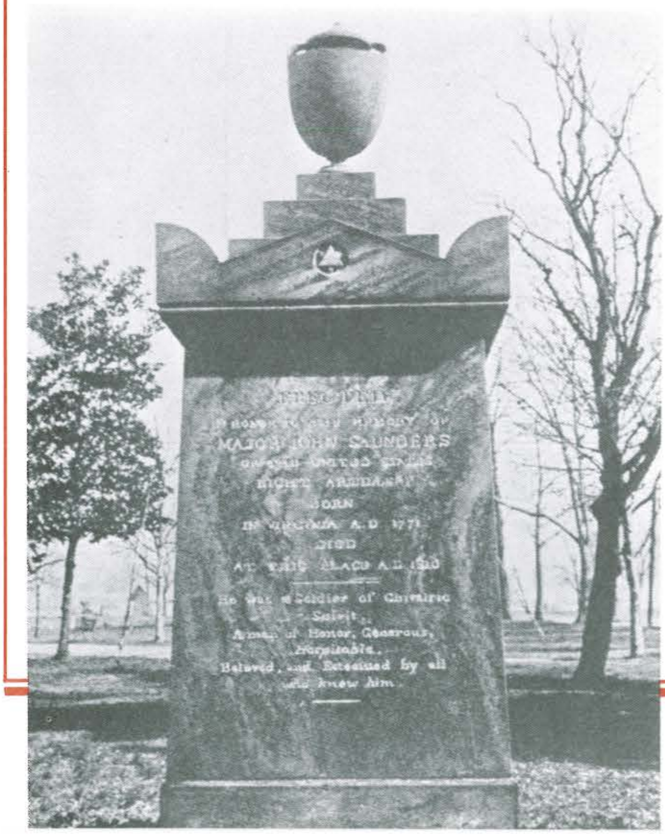
Tucked beneath a grove of trees on the grounds of the Portsmouth Naval Hospital is a soldier's grave. The stone monument that commemorates the resting place of MAJ John Saunders is less mysterious than the man whose grave it marks. Who was John Saunders and why is he buried at the Nation's oldest naval hospital?

We know very little about Saunders, only that he is listed in the *Complete Army and Navy Register of the United States* as being the sole Major of Light Artillery in 1809, the year prior to his death. What we do know is that he was the commanding officer of Fort Nelson in 1805 and died there on 15 March 1810, while on sick furlough.

Fort Nelson was a star-shaped Revolutionary War era bastion that guarded the Elizabeth River from the Portsmouth bank and occupied what is now Hospital Point. It was abandoned in 1820 when the newly-built Fortress Monroe made it obsolete. Seven years later workmen pulled down the walls of the old fort and used many of its bricks to construct the naval hospital.

Although Fort Nelson's former commander largely remains a mystery, his epitaph substantiates the fact that he was loved and respected by those who knew or knew of him. John Haviland, architect of the naval hospital, thought it appropriate to mark his grave with a suitable monument, and himself submitted a design to the Secretary of the Navy in 1828. He requested that the Secretary provide him with the inscription. Shortly thereafter, the monument was erected, carved from the same stone used to face the hospital's front. The carved stone urn originally adorning the monument has since disappeared.—JKH

The Saunders Monument about 1930



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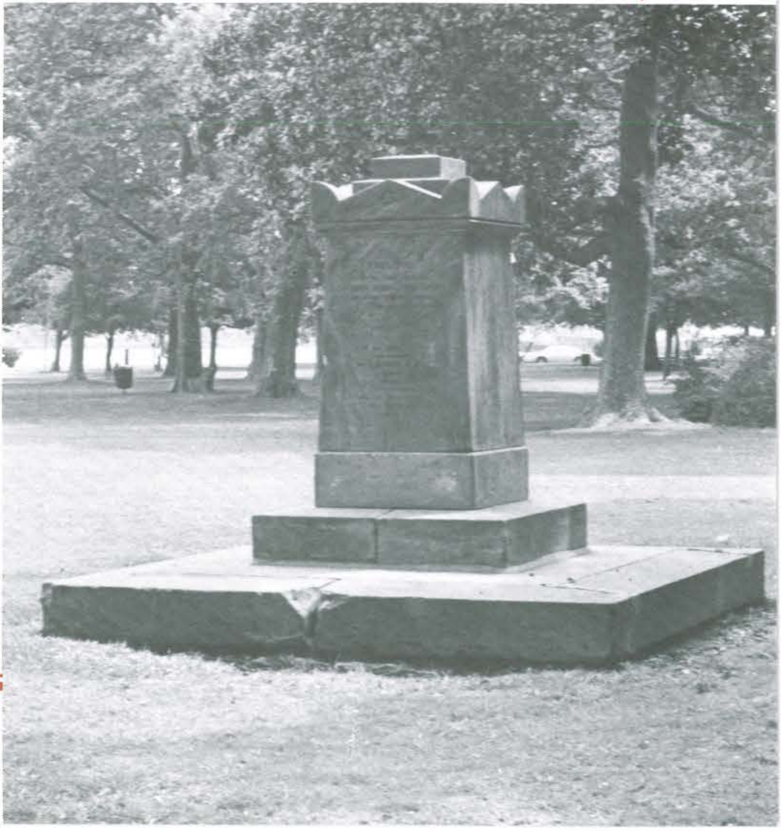


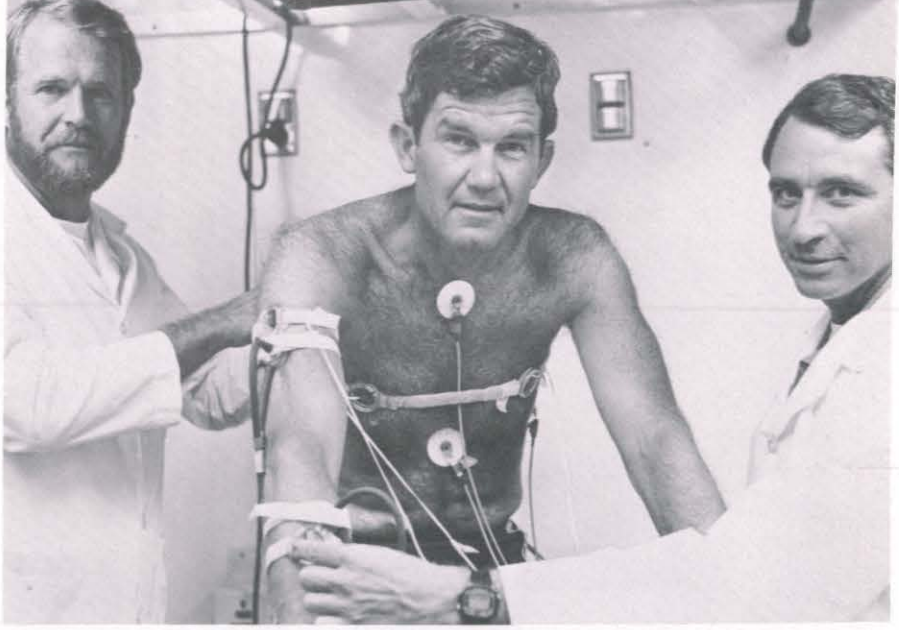
Science in Action:

The Naval Reserve ONR Biomedical Response Team 120 (Pacific)

LCDR W.A. Spaul, MSC, USNR-R

"Electrodes are in place and the subject is ready for testing" is a phrase which is frequently heard during the drill weekend of this Office of Naval Research Reserve unit. BIOMED ERTPAC 120, skippered by CAPT R.B. Flohr, is one of the very few ONR Reserve units which conduct biomedical human research during weekend drills. The unit identifies a research topic which is applicable to the Navy and/or Marine Corps, writes up the experimental protocols, and submits these protocols for review to an independent Human Research Experimentation Review Board (HRERB). Since the unit has no budget to purchase equipment or to pay subjects, it has been a challenge to obtain the laboratory facilities, biomedical monitoring equipment, and subjects. Through contacts with Dr. John Greenleaf of NASA's Human Environmental Physiology Laboratory, and with the Director of NASA Ames Research Center (Moffett Field, CA), NASA has allowed this unit to use NASA laboratory space and equipment on weekend drills, provided all experiments are also reviewed by NASA's HRERB. This process usually takes about 3 to 5 months, and is required prior to any testing.

The unit has just completed an investigation on the effects of protective skin lotions on human tolerance to hot environments. The idea came during a group ACDUTRA at the Naval Environmental and Preventive Medicine Unit 6 in Pearl Harbor last year and from epidemiological discussions with the Officer-in-Charge, CDR R. Hooper, MC, USN. Dr. Hooper commented that many marines in the tropics did not like to use the government-issued mosquito repellents because it made them "feel too hot." This comment is important because in many locations where the Marine Corps trains, insect-borne diseases pose serious risks to unprotected troops. A



Photos by HM1 Steve Emling

Figure 1. CAPT R.B. Flohr, the unit's commanding officer, as a subject. The author is on the right; ET1 Dirks on the left.

Dr. Spaul is an assistant professor in the College of Public Health, University of South Florida, Tampa, FL 33612.

similar comment had been reported about sun protective lotions. If a protective lotion was not used because it reduced one's tolerance to the heat or produced a sensation of "heat," then the unprotected troops training in these particular areas may be at a greater risk to serious insect-borne diseases than troops who used the protective lotions. On the other hand, these lotions could reduce the sweat or evaporation rate, thus reducing one's tolerance to the heat and subsequently increasing the risk of becoming a heat casualty.

During the drills following the ACDUTRA period, several members of BIOMED ERTPAC 120 designed an experiment to test the effects of various protective lotions on the ability to tolerate work in hot conditions. Oil-base sun protective lotions and alcohol-base mosquito repellents were tested against a control condition of no lotions. Six members volunteered as subjects, went through specialized medical examination, signed informed consent documents, and participated in a 9-month study. In addition to being a subject, each person was also a co-investigator. As far as being a subject was concerned, rank had no privileges, as can be seen in Figure 1.

Prior to a test period, each subject abstained from caffeine and alcohol products for 48 hours and did not shower or use any lotions for 24 hours. On arrival at the NASA laboratory, each person was weighed nude, showered with the same type of soap and had ECG stress test monitoring electrodes attached to his body (Figure 2). Each subject was then escorted to the Environmental Test Chamber and was seated on a bicycle ergometer. The exercise load was maintained at a heart rate of about 130 beats per minute, equivalent to half the maximal working capacity. Skin temperature probes and sweat capules were attached at this time (Figure 3). The air temperature was maintained at 106° F, and the subject pedaled continuously for 70 minutes. Throughout the experiment, seven skin temperatures, rectal temperature, two local sweat rates, heart rate, workload, environmental temperature, and relative humidity were recorded at 5-minute intervals. ET1 Dirks, HM1 Emling, and HM3 Boatman recorded the data and monitored the subjects. Much of the data reduction was simplified by the use of a Hewlett-Packard 86 personal computer.

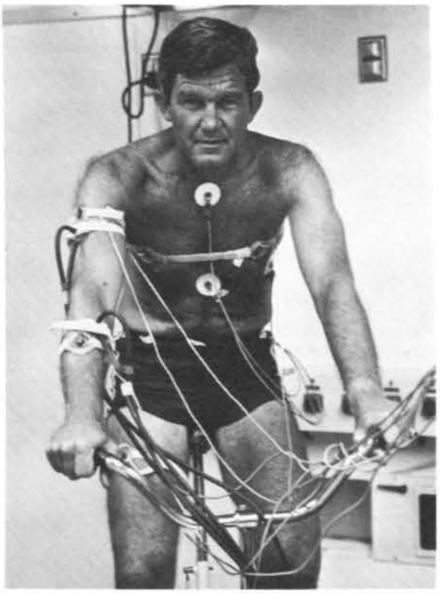


Figure 3. CAPT Flohr with biomedical monitoring electrodes and sensors attached.

According to CDR W. Crocker, MSC, the unit's executive officer, the co-investigator aspect provides "real life" training into the scientific method, experiment design, protocols involved with human research, familiarity with biomedical monitoring instrumentation, data collection and reduction, hypothesis test statistics, computer programming, and manuscript preparation. All of these skills will be very useful should the unit be mobilized to their training command, the Naval Bioscience Laboratory at Oakland Naval Supply Center. ☐

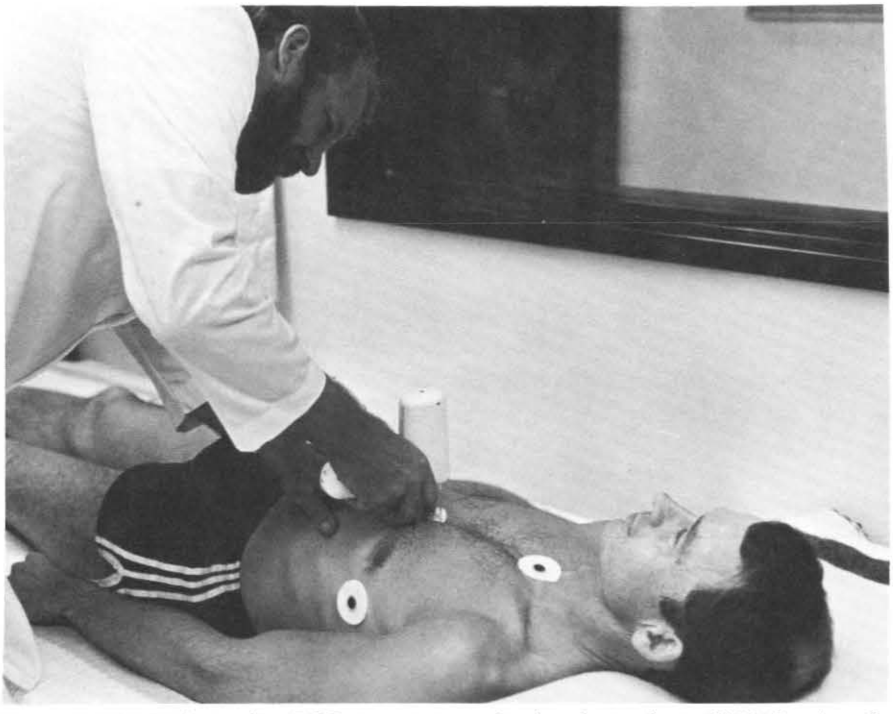


Figure 2. ET1 Dirks applies ECG stress test monitoring electrodes to CDR Crocker, the unit's executive officer.

(Editor's Note: This is not the first research project that members of this unit have completed during drill time. LCDR Spaul has collected field data on heat stress casualties during 3 years of ACDUTRA and has recently published the results in the March-April 1984 issue of U.S. Navy Medicine. *The results of this current study will be submitted for publication later this fall.)*

Carbon Monoxide Poisoning: The Malady and the Remedy

LDCR Ted J. Robinson, MC, USNR

In the March-April 1984 U.S. Navy Medicine *"Hey Doc" column, carbon monoxide poisoning was discussed as one leading cause of anemic hypoxia. The clinically observed effects of CO are complex and warrant additional attention.*

For decades it was felt that the major mechanism of carbon monoxide (CO) involved the binding of this molecule to the oxygen receptor on the hemoglobin molecule. This binding does occur and gives rise to carboxyhemoglobin which provides the basis for a confirmatory lab test in cases of CO poisoning.

Carbon monoxide binds to hemoglobin very tightly, having 200-210 times the affinity of 0_2, and thus is removed relatively slowly. The half-life of carboxyhemoglobin in the body has been determined to be approximately 5 hours and 20 minutes.(*1*) This large relative affinity is due to the much slower dissociation of CO from Hb, rather than an ability to associate preferentially. Therefore, if more oxygen molecules can be added to the system, the CO molecule may be prevented from binding or when dissociation does occur, an oxygen molecule is more likely to replace the CO. This mechanism provides the rationale for use of hyperbaric oxygen treatment in those cases of CO poisoning which manifest any neurologic or mental status changes. Treating these individuals in a hyperbaric chamber at 3 atmospheres of pressure on 100 percent oxygen by mask supplies 15 times as much 0_2 as breathing air at one atmosphere and thereby reduces the half-time of carboxyhemoglobin (CO-Hb) to about 23 minutes.(*1*)

Many physicians have recognized a disparity between the carboxyhemoglobin level and the clinical condition of the patient. Patients have been noted to be unconscious with CO-Hb levels of 25 percent and other patients are awake and oriented with levels of 40 percent.(*1*) The explanation for this seeming incongruity has been hinted at and suggested by numerous investigators as far back as 1926 and 1927. For instance, Warburg and Haldane independently came to the well-supported conclusion that CO has some direct effect on the tissue.(*2,3*)

Chance, et al, in 1970 reached the conclusion that CO bound to cytochrome a_3 oxidase, and intra-cellular hematin enzyme, as well as to hemoglobin. This effectively blocks cellular metabolism at the mitochondrial level. In 1975 Goldbaum, in a well controlled study using dogs, demonstrated the lack of correlation of clinical outcome and CO-Hb level. Three groups of five dogs were used in his study. The first group breathed 13 percent CO and died within 2 hours with CO-Hb levels of 54-90 percent. A second group was bled to an anemic state by removing an average of 68 percent of their hemoglobin and replacing it with saline. These dogs survived indefinitely. Group 3 dogs were bled the same as Group 2 except that they were then transfused with red cells from a donor dog with 80 percent CO-Hb. This brought their CO-Hb level to an average of 60 percent. The group 3 dogs, who were expected to die, lived indefinitely.(*5*) Only those dogs who actually inhaled the CO were affected to the degree expected.(*5*)

Carbon monoxide, like any gas, dissolves in the plasma, tissue fluid, and finally the intra-cellular fluid. Many of the enzymes that may be inactivated by CO are not known but it is known

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that CO adversely affects Cytochrome oxidase and Cytochrome P-450 mixed function oxidases.(*6,7*) While Coburn has raised legitimate questions regarding this proposed in-vivo mechanism of toxicity, it is now felt that the major mechanism of injury of CO is at the cellular level rather than *its binding* to hemoglobin. It is interesting, therefore, to speculate on the fate of cigarette smokers with a carboxyhemoglobin level of 5-18 percent if it were not for the strong binding of CO to the hemoglobin.(*8*)

Treatment of CO poisoning consists of 100 percent oxygen by mask at one atmosphere for mild cases, at 3 ata (66fsw) for those who develop neurologic or mental deficits. The treatment of the latter cases with hyperbaric oxygen (HBO) is most beneficial and seems to prevent the delayed deterioration seen in some cases not treated with HBO. (*9,10*) Making HBO available to patients poisoned with CO may also prevent an adverse medico-legal situation from developing.(*1,8*)

Treatment protocols vary from 46 minutes on 0_2 at 3 ata to Navy tables 5 or 6. All are adequate if guided by the patient's clinical condition more so than the CO-Hb level since there is not a good correlation between the two. Several prominent investigators have recommended treating suspected CO victims based upon a history consistent with exposure rather than on the CO-Hb level, especially if the patient is or has been symptomatic.(*11,1*) The advantages of this for the patient are numerous. HBO is a potent vasoconstrictor and therefore lowers CSF pressure almost immediately. In severely poisoned individuals, cerebral edema may be the final insult. HBO ameliorates this to a great degree, dropping the CSF pressure by 50 percent in 1 minute.(*1*) Dissolving 3 ata or about 2000 mmHg of 0_2 in the plasma does wonders for hypoxic areas. Animals have survived with no red cells at all under hyperbaric conditions, demonstrating that 6 Vol percent of 0_2 dissolved in plasma will support life in the absence of hemoglobin.(*12*) Unconscious patients with low CO-Hb levels have been known to awake during or shortly after HBO treatment.(*1*) This emphasizes the lack of correlation between the CO-Hb levels and the clinical state. Guidelines for treatment have been published by Kindwall and in his experience have resulted in decreased morbidity and mortality.(*1*) He recommends that any hospital with a chamber should treat all patients with CO-Hb levels of 25 percent or greater because this indicates a significant body content of CO. For hospitals which have chambers nearby, Dr. Kindwall recommends referring any patient with a CO-Hb level greater than or equal to 40 percent. Many Navy hospitals have chambers in close proximity and therefore should refer all patients with 40 percent or greater CO-Hb levels even if apparently asymptomatic. These patients have had a significant dose of CO and HBO therapy may prevent future problems. *Any* patient who is symptomatic should be referred for treatment if at all possible. If a mild headache is the only symptom, 100 percent 0_2 on the surface administered by tight-fitting mask, i.e., Scott, anesthesia, or aviator mask may be sufficient.

The Navy has a number of chambers which can and should be used to treat CO victims. Many tenders (AS), submarine rescue ships (ASR's), and other diving lockers have chambers suitable for treatment. We as Navy medical personnel may be able to reduce the morbidity and mortality of our patients exposed to carbon monoxide by providing a cooperative effort between our hospitals and the Undersea/Aerospace community.

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Nasopharyngeal Mass in a Healthy Young Man

LCDR Donald R. Lewis, MC, USNR

The presence of an obstructing mass lesion in the nasopharynx of a young adult male presents the practitioner with an interesting and significant differential diagnosis list. Included on the list is the nasopharyngeal angiofibroma. This lesion must be excluded from consideration before proceeding with treatment. The following report illustrates our method of dealing with this presentation. The histologic diagnosis is unusual.

Patient Report

A 20-year-old white male complained of left-sided nasal airway stuffiness of 2 years duration. He had experienced no nosebleeds nor other symptoms and had been treated with various oral decongestants and nasal sprays without benefit. His speech was hyponasal. Subsequent nasopharyngeal examination disclosed a 4 x 6 cm of firm multilobulated nasopharyngeal mass which was nontender (Figure 1). Digital examination suggested penunculation of this growth from the roof of the nasopharyngeal vault. The left nasal airway was obstructed and anterior rhinoscopy demonstrated the mass at the depths of the nasal passage without apparent entry into the choana. The remainder of the physical examination as well as the hemogram, urinalysis, blood chemistries, bleeding studies, and chest X-ray were normal.

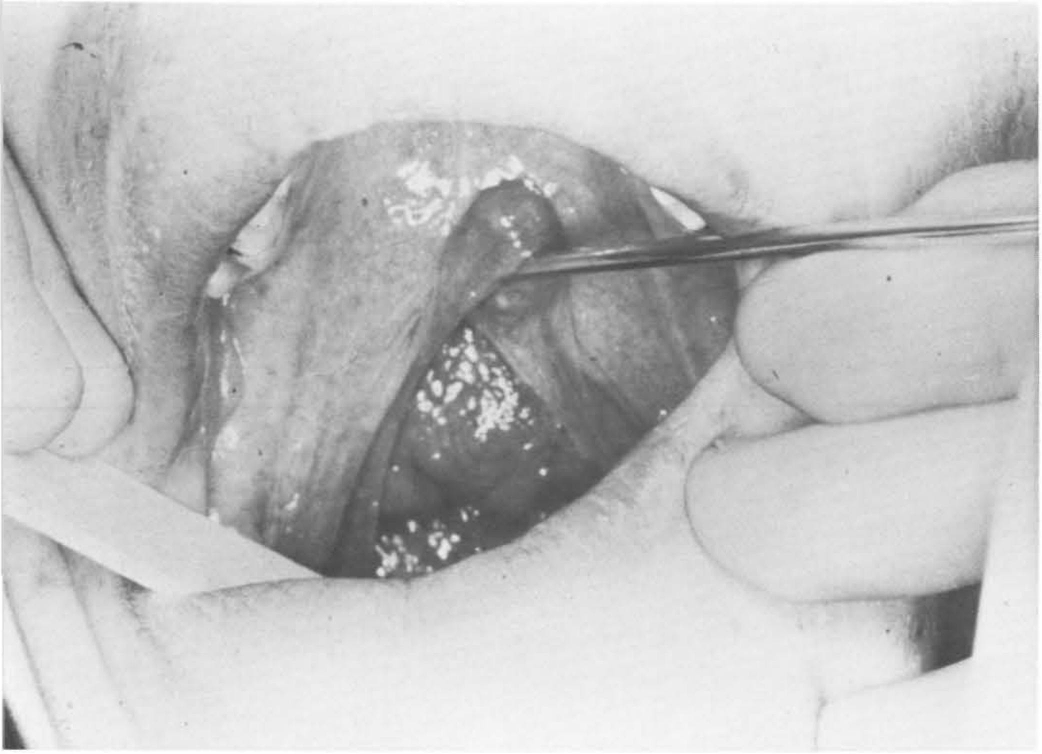

Figure 1

Computerized axial tomography (Figure 2) and standard tomography demonstrated the mass and suggested extension into the left sphenoid sinus. Carotid arteriograms were normal, showing no vascular blush within the tumor mass. Biopsy revealed no pathologic diagnosis, but there was a suggestion of fibroma, and no vascular component was appreciated.

A transpalatal approach was initiated, utilizing an inverted "U"-shaped flap based on the greater palatine neurovascular bundles. The mass was tethered to the basisphenoid region by a narrow pedicle. After removal of the growth (Figure 3), the sphenoid sinus was entered and found to be free of involvement. There was no significant bleeding, and the palatal flap was replaced and supported by a previously constructed acrylic stent, held in place by two wires to molar teeth.

Dr. Lewis is assigned to the Head and Neck Surgery Service at the Portsmouth Naval Hospital, Portsmouth, VA 23708.

The postoperative course was uneventful and the patient ate well on the first postoperative day when the anterior and posterior nasal packs were removed. Histologic diagnosis was hamartoma (Figure 4), and this impression was confirmed in consultation with Vincent Hyams, M.D., of the Armed Forces Institute of Pathology, who described a proliferation of muCoserous gland in a functional lobular pattern without evidence of other embryonal layer tissue.

On followup examination, the operative site was well healed and the patient was free of symptoms.

Discussion

Hamartomas are tumor-like, although non-neoplastic malformation of tissue development, which are composed of tissues indigenous to the area of occurrence with excess of one or more tissue type.(*1*) They are extremely rare, not more than a dozen case reports being found in the literature. The word itself was introduced by Albrecht (1904)(*2*) utilizing the Greek word "hamartia" meaning defect or error combined with "-oma" denoting mass or tumor. Willis(*3*) added the criterion of congenital or developmental anomaly. Majumder (*4*) succinctly pointed out their differentiation from teratomas and dermoids. Teratomas are spontaneous, autonomous new growths from pleuripotential tissues. Tissues are foreign to the area of occurrence and the presence of all three germ layers is essential. Dermoids are derived from ecto and endoderm with the ectodermal element predominating. Hamartomas, entirely derived from local tissues, are spontaneously developing new growths producing an excess number of cells which grow to maturity and then cease dividing. Thus the growth is self-limited.

Zarbo and McClatchey(*5*) found two principal types of nasopharyngeal hamartoma based on histologic criteria. The first is composed primarily of mesodermal elements, the second being composed of mucosal, epithelial, and glandular elements. The case

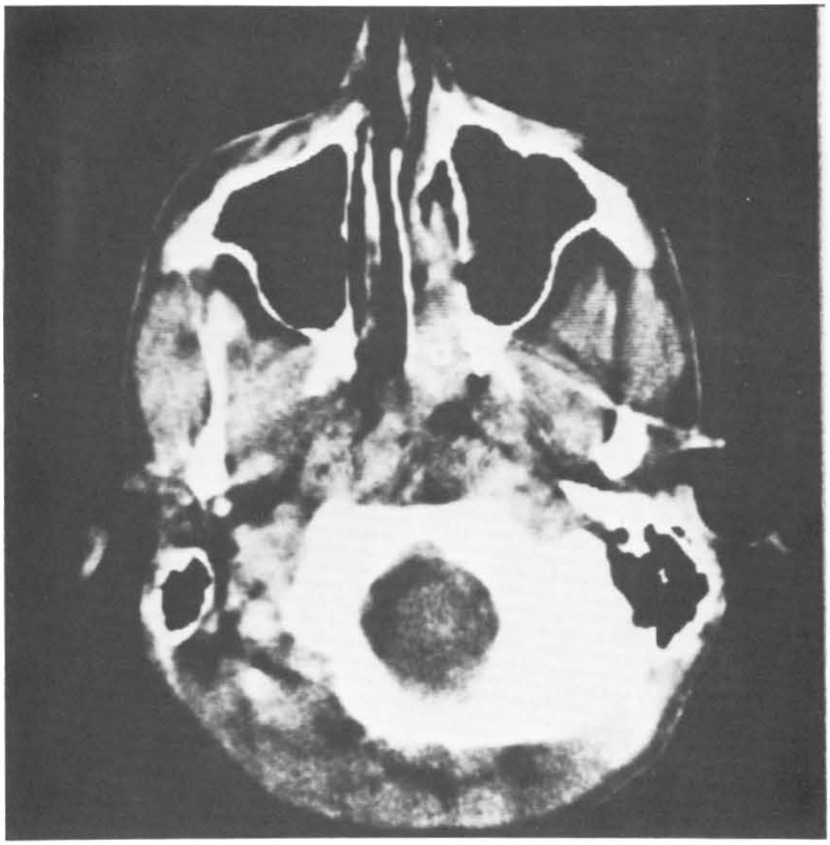

Figure 2

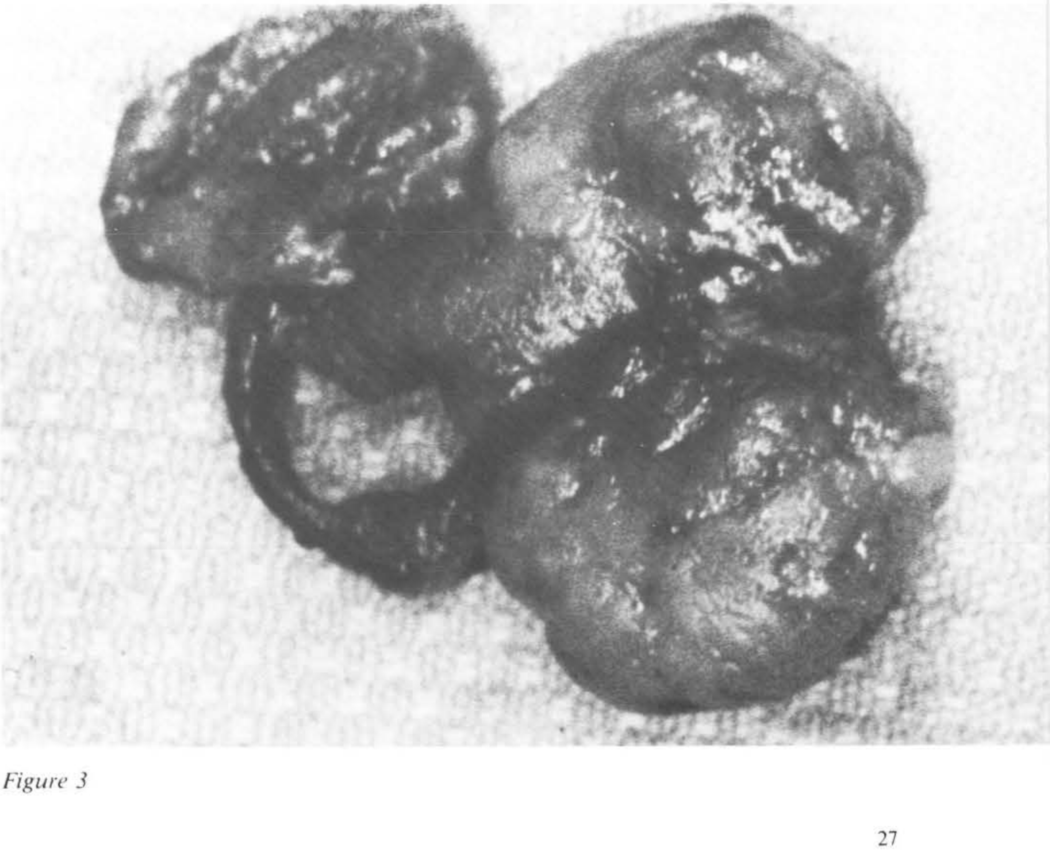

Figure 3

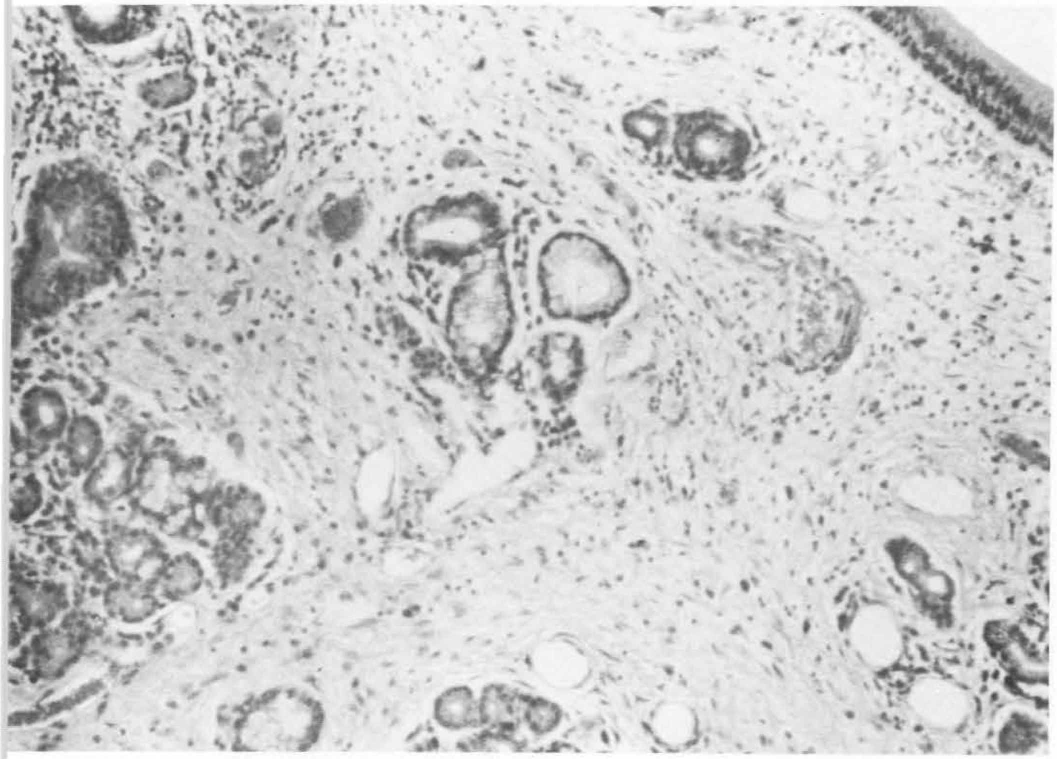

Figure 4

reported herein is of the latter type. The first report in our literature of this histologic type mass in the nasopharynx was by Baille and Batsakis in 1974. (*6*) In their patient there was a history of nasal obstruction and recurrent nosebleed, common symptoms with these tumors. The mass was removed transorally utilizing a tonsil snare to sever the stalk connecting the mass to the vomer region. The histologic picture of seromucinous glands in a fibrous stroma was similar to that in our case. It is rather our approach to the differential diagnosis and our surgical method which constitute the thrust of this communication.

Our differential list included chordoma, teratoma, dermoid, craniopharyngioma, fibromas, angiofibroma, papilloma, adenoma, lipoma, enchondrosis, exostosis, lymphoepithelioma, squamous cell carcinoma, sarcoma, lymphoma, antrochoanal polyp, and tuberous sclerosis.

Catastrophic results have ensued when, without checking for vascularity or even considering the issue, a mass in the nasopharynx has been biopsied in the clinic only later, perhaps at necropsy, diagnosed as angiofibroma. Thus we began an extensive evaluation to determine the size, invasiveness, and blood supply of this mass. Faced with a young man with a nasopharyngeal mass and obstruction, even in the absence of recurrent epistaxis so characteristic of this entity, we felt obliged to eliminate this diagnosis by angiographic examination. That the mass did not even significantly ooze when stuck with an 18 gauge needle did not satisfy us of its avascularity.

Utilizing computerized tomography, complex motion tomography, and angiography, we were able to gain as much information preoperatively as was reasonably possible. Even then, we opted for wide exposure to afford us binocular vision and two-hand instrumentation. Easy resection and a virtually pain-free recovery ensued.

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In Memoriam

RADM *Bruce E. Bradley, Sr.,* MC (Ret.), former Deputy Surgeon General of the Navy and medical director of the Bankers Trust Company of New York died 19 Sept 1984 after a brief illness at Baylor University Medical Center, Dallas, TX.

Born 29 Sept 1902, in Raleigh, NC, Dr. Bradley earned his B.S. and M.D. from the University of Virginia in 1926 before beginning his Navy career serving with the Marines in Nicaragua. He was then transferred to the South China Patrol for the 4 years preceding World War II. He attended the Command School at the U.S. Naval War College, and subsequently led a Navy medical unit for the duration of World War II.

At the conclusion of the war, Dr. Bradley commanded the "Bradley Naval Medical Clinic" on Bougainville, New Guinea, which was highly commended by Admirals Nimitz and Halsey. He was awarded the Legion of Merit for his extraordinary wartime contributions.

Returning to the Bureau of Medicine and Surgery in Washington, DC, Dr. Bradley was assigned to present the Medical Corps budget to Congress and devise incentives to retain doctors in the military. He then became executive officer of Bethesda Naval Hospital and Long Beach Naval Hospital.

During the Korean War he was commanding officer of Key West Naval Hospital, the site of President Harry Truman's "southern" White House. After becoming commanding officer of Oak Knoll Naval Hospital, he was promoted to rear admiral, and subsequently became Deputy Surgeon General. He concluded his 35 years of naval service by returning in 1961 as CO of the National Naval Medical Center, Bethesda, MD.

Dr. Bradley's 22-year civilian medical career began as medical director of the Bankers Trust Company of New York City. This past year he became medical director emeritus at age 81 and continued to work there full time until his death.

CAPT *Earl H. Ninow,* MC (Ret.), former physician and chief of White House social aides during the Johnson administration, died 13 Aug 1984 when his plane crashed near Keene, NH. He was 59.

Born in Chilton, WI, Dr. Ninow graduated from Marquette University, where he also earned his medical degree. He received a master's degree in business administration from George Washington University and graduated from the Naval War College.

Dr. Ninow served in the Medical Corps during World War II and during the Korean War. In 1963 he was assigned to the White House staff and served 3 years. He also had duty at several Navy hospitals throughout his career.

Dr. Ninow retired from the Navy in 1976 and became a physician surveyor with the Joint Commission on Accreditation of Hospitals, where he worked part-time until his death.

Letter to the Editor

I would like to make a few comments regarding an article in the March-April 1984 issue entitled "Independent Duty in Seoul."

- The unaccompanied tour for USN personnel in Korea is 13 months vice "a 3-year Korean tour . . ."
- There are (or were) about 200 USN/USMC personnel in Seoul. Any other personnel seen by the USN corpsman are on a courtesy basis (the Marines assigned State Department duty at the Embassy have a civil service nurse assigned and the United Nations Command personnel can be seen by Army medical personnel).
- The average patient load could be realistically estimated at 10-15 per day (that is Monday-Friday as the Army health clinic is "closed" on weekends). Being "on call 24 hours a day" is true, but rarely, if ever, is the MDR "broken out" after normal working hours—as so often happens afloat.
- The HM billet in Seoul is a general duty (HM 0000/0000) assignment and not an independent duty (HM 8425) billet as there are normally 5-6 Army medical officers within about 10 paces from the USN corpsman's office. I find the "saving the Army doctors 250-300 patients a month" statement a vastly inflated figure—I'd say 100-150 is more like it.

I suggest that when such articles are submitted by "sister services," that they be researched or at least input from the USN parent command (in this case COMUSNAVFORKOREA) be solicitated. This article by SSGT Small is good copy, but in some places, inaccurate. How do I know? I was the MDR in Seoul from 1979 to 1981 and HM1 (now HMC) Mangoian was my relief.

Sincerely,
B.M. Stenhouse
HM1, USN
Navy Reserve Center
Portland, OR

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